

# ADDENDUM

**Addendum No.** C1573M

**Date** February 1, 2006

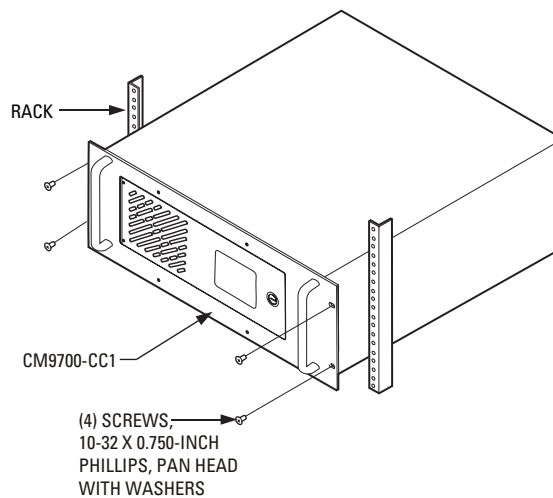
**Manuals Affected** C1572M, C1555M-F, C1566M-C

**Manual Update** The front and rear mounting rails and the mounting brackets are no longer supplied with the CM9700-CC1.


Disregard the CM9700-CC1 mounting information in the above referenced manuals.

To mount the CM9700-CC1 into a standard 19-inch EIA rack follow these instructions:

1. Insert the CM9700-CC1 into the rack.
2. Tighten the CM9700-CC1 to the rack using the four supplied Phillips screws with washers.



**Figure 1.** Mounting the CM9700-CC1

 The materials used in the manufacture of this document and its components are compliant to the requirements of Directive 2002/95/EC.



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# **System 9760<sup>®</sup> Video Matrix Switching Control System**



**C1572M (9/05)**



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# Important Safety Instructions

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1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
14. Apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.
15. **WARNING:** To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.
16. Installation should be done only by qualified personnel and conform to all local codes.
17. Unless the unit is specifically marked as a NEMA Type 3, 3R, 3S, 4, 4X, 6, or 6P enclosure, it is designed for indoor use only and it must not be installed where exposed to rain and moisture.
18. Use only installation methods and materials capable of supporting four times the maximum specified load.
19. A readily accessible disconnect device shall be incorporated in the building installation wiring.
20. The socket-outlet shall be installed near the equipment and shall be easily accessible.
21. A CCC-approved power cord must be used to power this equipment when used in China.

**CAUTION:** These servicing instructions are for use by qualified service personnel only. To reduce the risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

**CAUTION:** Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type. Dispose of used batteries according to the instructions provided by the battery manufacturer.

Only use replacement parts recommended by Pelco.

The product and/or manual may bear the following marks:



This symbol indicates that dangerous voltage constituting a risk of electric shock is present within this unit.



This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

<b>CAUTION:</b>
<b>RISK OF ELECTRIC SHOCK. DO NOT OPEN.</b>



# Regulatory Notices

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## **CM9700-CC1**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### **RADIO AND TELEVISION INTERFERENCE**

This equipment has been tested and found to comply with the limits of a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However there is no guarantee that the interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You may also find helpful the following booklet, prepared by the FCC: "How to Identify and Resolve Radio-TV Interference Problems." This booklet is available from the U.S. Government Printing Office, Washington D.C. 20402.

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

In order to maintain compliance with FCC regulations shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and television reception.

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

## **CM9760-MXB**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

### **RADIO AND TELEVISION INTERFERENCE**

This equipment has been tested and found to comply with the limits of a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes and Modifications not expressly approved by the manufacturer or registrant of this equipment can void your authority to operate this equipment under Federal Communications Commission's rules.

In order to maintain compliance with FCC regulations shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and television reception.

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

# System Overview

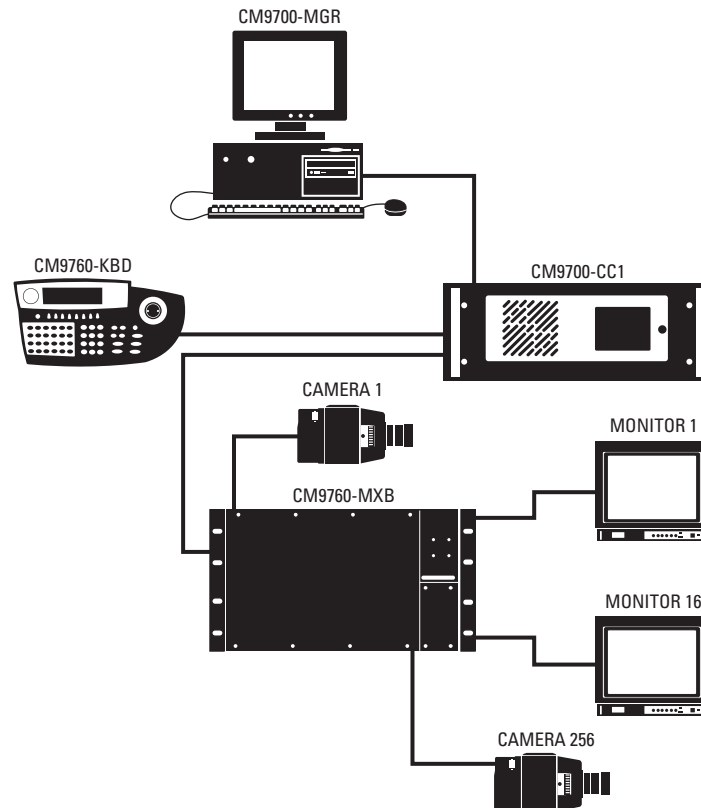
This section provides an overview of the System 9760® video matrix switching control system, hereinafter referred to simply as the 9760 system. The following information is provided:

- Description of the basic components of the 9760 system
- Summary listing of 9760 system device models and compatible equipment

## DESCRIPTION

The 9760 system allows control and monitoring of up to 2,048 video input devices (for example, cameras) and 512 video output devices (for example, monitors). The 9760 system consists of the following basic components (refer to Figure 1):

- CM9700-CC1 central processing unit (CPU): Controls system operation and therefore is also commonly referred to as the controller. Connects to a wide variety of peripheral equipment. Detailed information about the CM9700-CC1 is provided in this manual.
- CM9760-MXB matrix bay: Performs all video switching functions as directed from the CM9700-CC1. Connects to a maximum of 256 video input devices and 16 video output devices. Detailed information about the CM9760-MXB is provided in this manual.
- CM9760-KBD keyboard: Provides the user interface to system operations. Detailed information about the CM9760-KBD is provided in the CM9760-KBD/KBR Keyboard Installation/Operation manual.
- CM9700-MGR system management software: Allows easy system setup and configuration and therefore is also commonly referred to as the System Manager. Requires installation on a PC that meets CM9700-MGR system requirements. Detailed information about the CM9700-MGR software and PC system requirements is provided in the CM9700-MGR Software Guide.



**Figure 1.** Basic Components of a 9760 System

**NOTE:** If your 9760 system includes a CM9760-CC1 that is running version 8.03.xxx or earlier software and you are using CM9760-MGR software, refer to the CM9760-CC1 and CM9760-MGR documentation provided with your system.

In addition to the basic components, you can also use peripheral devices in the 9760 system. Peripheral devices include equipment such as KBD300A/KBD200A keyboards, CM9760-MDA master distribution amplifiers, CM9760-ALM alarm interface units, CM9760-REL relay interface units, Genex® multiplexers, and Pelco® VCRs.

Note the following:

- To ensure uninterrupted operation, the 9760 system can be equipped with a backup CM9700-CC1 by means of a CM9760-HS hot switch. For detailed information about the CM9760-HS, refer to the CM9760-HS Hot Switch Installation/Operation manual.
- The CM9700-NW1, commonly referred to as the network interface unit (NIU), can be used to connect two or more CM9700-CC1 units to create a networked system. Each CM9700-CC1 unit and attached devices comprise a node in the network. For detailed information about the CM9700-NW1, refer to the System 9760 Networking Guide.
- You can increase video output capacity of a single node from 128 to a maximum of 512 by using CM9760-MDA units. For detailed information about the CM9760-MDA, refer to the CM9760-MDA Master Distribution Amplifier Installation/Operation manual.

## MODELS

The following provides a list of models of 9760 system devices and compatible equipment.

### CPU CONTROLLER AND COMPONENTS

CM9700-CC1	CPU controller. Operates on 120 VAC, 60 Hz or 230 VAC, 50 Hz.
CM9700-SER	Serial communication (SERCOM) card (RS-422). Provides 8 SERCOM ports to interface peripheral equipment (4 cards maximum per CM9700-CC1).
CM9700-SER-32	Port expansion unit. Provides 32 SERCOM ports. Includes interconnecting cables and adapters for DB9 and RJ-45 connectors. Data interface can be RS-232 or RS-422. Up to 3 units can be added to a CM9700-CC1. (Check with Pelco Systems Applications Department before adding to an existing CM9700-CC1.)

### MATRIX BAY AND COMPONENTS

CM9760-MXB	Video matrix bay equipped with CM9760-MPS power supply. Operates on 120 VAC, 60 Hz.
CM9760-MXB-X	Same as CM9760-MXB except operates on 230 VAC, 50 Hz.
CM9760-MXBL	Video matrix bay for use with CM9760-DFL downframe looping cards. No power required.
CM9760-MPS	Matrix bay power supply (spare). Operates on 120 VAC, 60 Hz.
CM9760-MPS-X	Matrix bay power supply (spare). Operates on 230 VAC, 50 Hz.
CM9760-RPC	Rear panel input card. Provides 16 BNC connectors to connect video inputs to matrix bay.
CM9760-RPL	Double-wide rear panel card for single-bay looping. Reduces maximum number of inputs to 128.
CM9760-DFC	Downframe rear panel card and cable assembly. Connects multiple matrix bays for expansion purposes.
CM9760-DFL	Downframe rear panel card and cable assembly with BNC connectors for looping video.
CM9760-VCC	Video input card capable of accepting up to 16 video inputs. Also requires a rear panel card (CM9760-DFC, CM9760-DFL, or CM9760-RPC, or CM9760-RPL).
CM9760-RPM	Rear panel output card. Provides 16 BNCs to connect video outputs to matrix bay. Also interfaces video output signals from CM9760-VMC4, CM9760-VMC8, CM9760-VMC12, or CM9760-VMC16 video output card.
CM9760-VMC4	Video output card providing 4 video outputs. Requires CM9760-RPM.
CM9760-VMC8	Video output card providing 8 video outputs. Requires CM9760-RPM.
CM9760-VMC12	Video output card providing 12 video outputs. Requires CM9760-RPM.
CM9760-VMC16	Video output card providing 16 video outputs. Requires CM9760-RPM.
CM9760-VMM	Video output module. Expands outputs of CM9760-VMC4, CM9760-VMC8, and CM9760-VMC12 video output cards.

### KEYBOARDS

CM9760-KBD*	Full-function desktop variable-speed keyboard. Operates on 120 VAC, 60 Hz.
CM9760-KBD-X*	Same as CM9760-KBD except operates on 230 VAC, 50 Hz.
CM9760-KBR*	Full-function 19-inch EIA rack mount keyboard. Operates on 120 VAC, 60 Hz.
CM9760-KBR-X*	Same as CM9760-KBR except operates on 230 VAC, 50 Hz.
KBD300A	Desktop keyboard with full switching capabilities plus joystick control of PTZ functions. Operates on 12 VAC or $\pm 12$ VDC. (Requires KBDKIT for power.)
KBD200A	Desktop keyboard with full switching capabilities plus push-button control of PTZ functions. Operates on 12 VAC or $\pm 12$ VDC. (Requires KBDKIT for power.)

\*Software version 8.03 or higher is required.

## NETWORK INTERFACE UNIT

CM9700-NW1	Network CPU and software necessary for joining two or more independent systems together. Allows multiple systems to share video and control. Commonly referred to as the network interface unit (NIU).
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## OPTIONAL COMPONENTS

CM9760-ALM	Alarm interface unit. Connects directly to each system. Each unit can monitor up to 64 alarms. Up to four units can be connected in a series from one SERCOM port.
CM9760-CDU-T	Code distribution unit. Sixteen-channel RS-422 transmit-only (two data wires and ground) distributor. Primarily used for wiring up to 16 pan/tilt/zoom receivers in a "star" configuration.
CM9760-CXTA	Coaxitron® translator. Generates Coaxitron signals for Pelco Coaxitron receivers. Each translator supports up to 16 receivers.
CM9760-DMR	Data merger and port expander unit. Allows multiple CM9700-CC1 units to control multiple pan/tilt/zoom cameras and allows multiple keyboards to communicate through one CM9700-CC1 port.
CM9760-DMR-X	Same as CM9760-DMR except operates on 230 VAC, 50 Hz.
CM9760-HS	Hot switch interface unit. Changeover unit that monitors the status of a primary CM9700-CC1 in the system.
CM9760-MDA	Master distribution amplifier. Inserts master time and date from the CM9700-CC1 and a programmable title of up to 24 characters on 1 to 16 video signals.
CM9760-MDA-X	Same as CM9760-MDA except operates on 230 VAC, 50 Hz.
CM9760-REL	Relay interface unit. Connects directly to each system and provides dry contact switching for direct or automatic control of peripheral equipment. Each unit provides up to 64 SPST contact outputs.
CM9760-VCRC Series	VCR controllers capable of controlling 64 VCRs.
Genex Multiplexers	Genex Series MX4009 (9-channel) and MX4016 (16-channel) multiplexers.
VMX200 and VMX300 Series	Video management systems. Graphical map/icon-based user interface for mouse-driven operator control from external PC.

## COMPATIBLE RECEIVERS

Spectra® Series	Spectra dome multiple protocol receiver.
ERD97P21-U	Pelco P-protocol receiver.
LRD41C21-1/-2/-3	Legacy® fixed speed receiver with presets.
LRD41C22-1/-2/-3	Same as LRD41C21 Series except variable speed receiver.
Esprit®	Integrated pan/tilt positioning receiver.
ExSite™	Integrated pan/tilt explosionproof positioning receiver.
Coaxitron	Coaxitron translator allows Coaxitron control of PTZ cameras.

# System Setup

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This section provides information about the following:


- Overview of tasks necessary to set up a 9760 system
- Unpacking the CM9700-CC1 controller and CM9760-MXB matrix bay
- Installing the CM9700-CC1 controller
- Installing CM9760-MXB matrix bay(s)
- Verifying system operation

## SYSTEM SETUP OVERVIEW

The following provides an overview of the tasks necessary to set up a 9760 system and prepare the system for operation. It is recommended that you perform the tasks in the order listed below.

**NOTE:** For detailed instructions to perform the tasks listed below for setup of the CM9700-CC1 and CM9760-MXB, refer to the *Unpacking, Installing the CM9700-CC1 Controller*, and *Installing CM9760-MXB Matrix Bay(s)* sections in this manual. For detailed instructions to perform the tasks listed below for setup of all other devices in your system, refer to the manual provided for the device.

1. Unpack all equipment. Verify delivery according to the packing slip. Keep all manuals and cables with the associated equipment.
2. Select a location within a standard 19-inch (48.26 cm) EIA rack for each device to be mounted.
3. Mount each device into the selected location within a rack.

 **DANGER:** When mounting equipment into a rack, always install equipment starting from the bottom of the rack. Installing equipment starting from the top of the rack can cause the rack to topple.

4. Verify that the correct number of cards and power supplies have been installed in each CM9760-MXB in the system according to the system order.
5. Install the CM9700-MGR software on a PC, and then do the following:
  - a. Copy the startconfig.psm file from the CM9700 Factory Configuration Data CD.
  - b. Open the startconfig.psm file using the CM9700-MGR.

### NOTES:

- The CM9700-MGR software is contained on the CM9700 Resource CD, which is provided in the System 9760 binder. For CM9700-MGR software installation instructions, refer to the CM9700-MGR Software Guide, which is also provided in the System 9760 binder.
- The CM9700 Factory Configuration Data CD is provided in the System 9760 binder.
- Do not modify the system using the CM9700-MGR until after you have verified system operation in step 12 below.

6. Connect all system devices to the CM9700-CC1 according to the CM9700-CC1 port assignments listed in the System 9760 port assignment table.

**NOTE:** The System 9760 port assignment table, titled "System 9760 Factory Default Port Settings," is provided in the System 9760 binder. Detailed information about the System 9760 port assignment table is provided in the *Installing the CM9700-CC1 Controller* section in this manual.

7. Connect power cabling to all devices.
8. Power on all devices connected to the CM9700-CC1.
9. Power on the CM9700-CC1.
10. Check diagnostic LEDs on devices to ensure that the devices are operating properly.
11. Connect all other cabling—for example, video input and output cabling—to all devices as appropriate.
12. Verify system operation (refer to the *Verifying System Operation* section in this manual).

## UNPACKING

Various items are supplied with the CM9700-CC1 and with the CM9760-MXB. Refer to the *Unpacking the CM9700-CC1* and *Unpacking the CM9760-MXB* sections for a list of items supplied with the units.

### UNPACKING THE CM9700-CC1

The following items are supplied with the CM9700-CC1:

- 1 CM9700-CC1 unit, with front rack ears installed
- 1 120 VAC, 60 Hz power cord (USA standard)
- 1 230 VAC, 50 Hz power cord (European standard)
- 1 Keyboard, PS/2
- 1 PS/2-to-AT keyboard adapter
- 1 BNC extraction tool
- 2 Brackets with a set of 6 screws, 8-32 x 0.250-inch, pan head
- 2 Adjustable support rail sets (each set includes 1 front-mounting rail and 1 rear-mounting rail) and the following sets of screws:
  - 6 Screws, 8-32 x 0.375-inch, pan head with washers
  - 12 Screws, 10-32 x 0.375-inch, flat head
  - 4 Screws, 10-32 x 0.750-inch, Phillips, pan head with washers
  - 6 Screws, 8-32 x 0.250-inch, Phillips, pan head

### UNPACKING THE CM9760-MXB

The following items are supplied with the CM9760-MXB:

- 1 CM9760-MXB matrix bay, with front rack ears installed
- 1 Power cord:
  - For the CM9760-MXB: 120 VAC, 60 Hz power cord (USA standard)
  - For the CM9760-MXB-X: 230 VAC, 50 Hz power cord (European standard)

**NOTE:** If the matrix bay is shipped with two power supplies installed, then two 120 VAC or 230 VAC power cords are supplied.

- 1 RJ-45 reversed data cable
- 8 Screws and washers for mounting the bay
- 1 Sheet of video input number labels that can be affixed to the rear panel BNC cards to correspond to video input numbers

In addition, one CM9760-VMC video output card, the appropriate number of CM9760-VCC video input cards, associated rear panel cards, and up to two power supplies are installed in the matrix bay according to your system order.

## INSTALLING THE CM9700-CC1 CONTROLLER

Installation of the CM9700-CC1 includes the following tasks:

- Selecting a location for the CM9700-CC1 in a standard EIA rack
- Mounting the CM9700-CC1
- Connecting the CM9700-CC1
- Powering on the CM9700-CC1

To perform each of the above tasks, refer to the sections that follow.

### SELECTING A LOCATION FOR THE CM9700-CC1

The CM9700-CC1 is designed to be mounted into a standard 19-inch (48.26 cm) EIA rack. When selecting a location in a rack for the CM9700-CC1, note the following:

- The CM9700-CC1 occupies 4 RUs or 7 inches (17.78 cm) of vertical rack space.
- The maximum distance allowable between the CM9700-CC1 and a CM9760-MXB is 4,000 feet (1,219 meters).
- Allow at least 1 RU or 1.75 inches (4.5 cm) of space above the CM9700-CC1 for air circulation.

### MOUNTING THE CM9700-CC1

Brackets and support rails are provided to mount the CM9700-CC1 into a rack. The brackets and support rails are provided for your convenience but are not required.

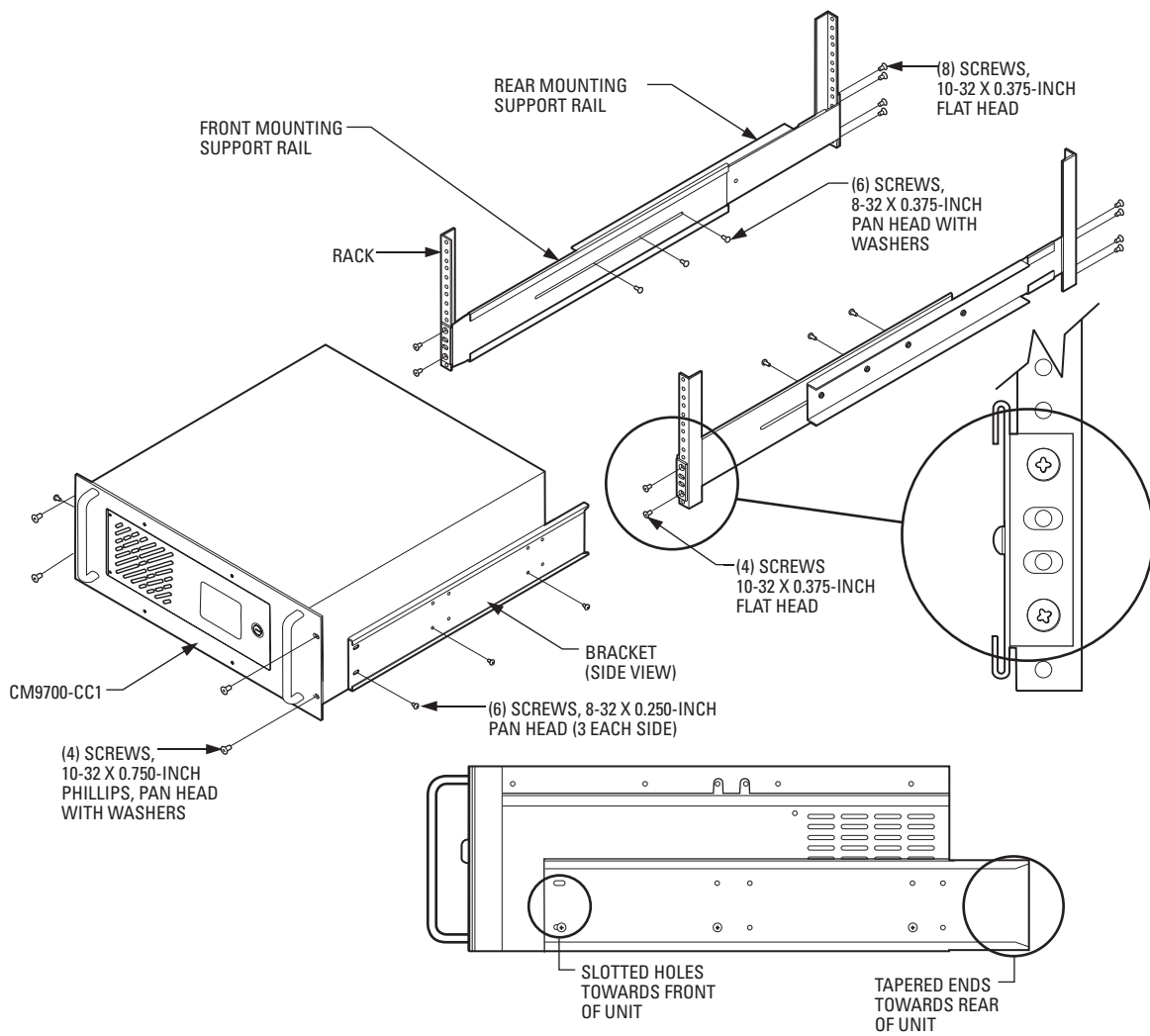
To mount the CM9700-CC1 without the brackets and support rails, fasten each rack ear of the CM9700-CC1 to the rack using two 10-32 x 0.750-inch Phillips pan head screws and washers for each ear.

To mount the CM9700-CC1 using the supplied brackets and support rails, refer to Figure 2 and perform the following steps:

1. Attach one bracket to each side of the CM9700-CC1 using three 8-32 x 0.250-inch pan head screws for each side. Attach each bracket so that the slotted holes in the bracket are positioned toward the front of the CM9700-CC1 and the tapered ends of the bracket are positioned toward the rear of the CM9700-CC1.
2. For each set of support rails, attach the front-mounting support rail to the rear-mounting support rail using three 8-32 x 0.375-inch pan head screws and washers for each set. Leave the screws loose until the support rails are attached to the rack.
3. Attach one set of support rails to the equipment rack in the desired location as follows:
  - a. Position the ear of the front-mounting support rail against the front of the equipment rack and align the holes in the ear of the rail with the threaded holes in the rack. Attach the ear of the rail to the rack using two 10-32 x 0.375-inch flat head screws.
  - b. Adjust the support rails to the correct depth of the equipment rack by sliding the rear-mounting support rail to the back of the equipment rack.
  - c. Attach the ear of the rear-mounting support rail to the rear of the equipment rack using four 10-32 x 0.375-inch flat head screws. (The holes in the ear of the rail should align with the threaded holes in the equipment rack.)
4. Tighten the three 8-32 x 0.375-inch pan head screws and washers that were attached to the front- and rear-mounting support rails in step 2 above.
5. Repeat steps 3 and 4 for the second set of support rails.
6. Place the CM9700-CC1 onto the support rails and slide the unit into the rack. The CM9700-CC1 should slide in and out of the rack easily.

 **DANGER:** When sliding the CM9700-CC1 out of the rack, be careful not to let the unit fall out of the rack.

7. Fasten each rack ear of the CM9700-CC1 to the equipment rack using two 10-32 x 0.750-inch Phillips pan head screws and washers for each ear.



**Figure 2.** Mounting the CM9700-CC1



## CONNECTING THE CM9700-CC1

System 9760 devices and other equipment connect to the rear panel of the CM9700-CC1 (refer to Figure 3).

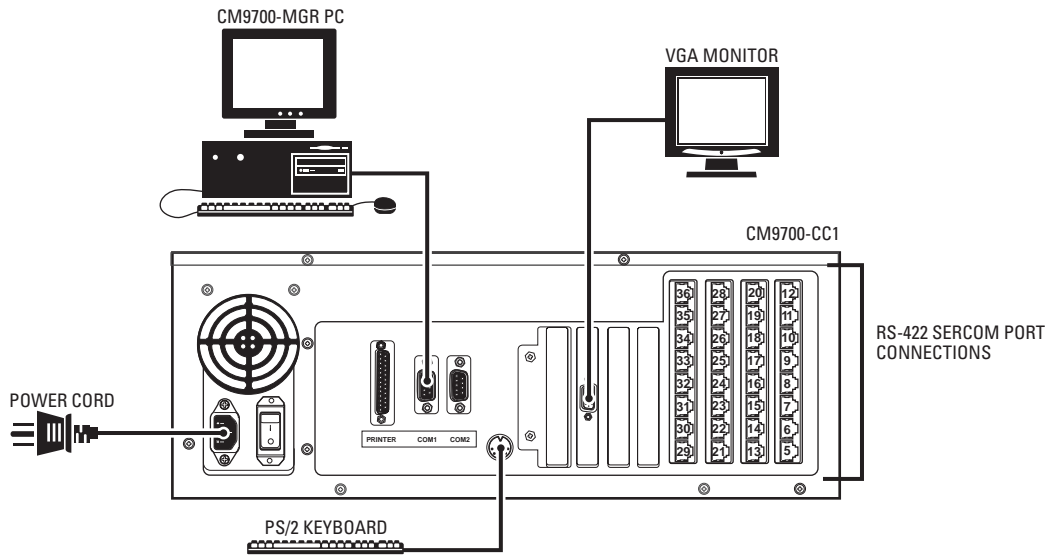


Figure 3. CM9700-CC1 Connections

As illustrated in Figure 3, CM9700-CC1 connections include the following:

- CM9700-MGR PC (RS-232 serial communication)
- VGA monitor
- PS/2 keyboard (supplied)
- System devices for RS-422 serial communication (for example, matrix bays, keyboards, and pan/tilt or dome receivers)
- Power cord (supplied)

For detailed information about each of the above connections, refer to the sections that follow.

**NOTE:** For detailed information about connecting ASCII communication devices to the CM9700-CC1, refer to *Appendix A*.

### Connecting the CM9700-MGR PC to the CM9700-CC1

#### NOTES:

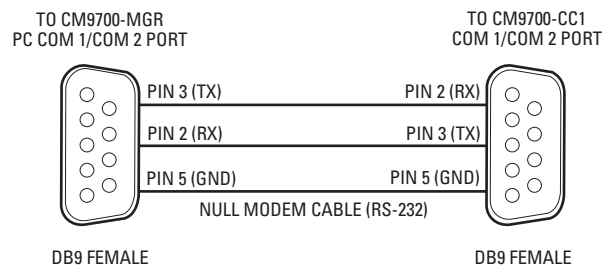
- It is recommended that you install the CM9700-MGR software on the PC before connecting the PC to the CM9700-CC1. For CM9700-MGR software installation instructions, refer to the CM9700-MGR Software Guide.
- If your system is a networked system containing a CM9700-NW1 network interface unit, the CM9700-MGR PC connects to the CM9700-NW1 rather than to a CM9700-CC1.

To connect the CM9700-MGR PC to the CM9700-CC1, refer to Figure 3 and do the following:

1. Using a null modem cable (not provided), connect one end of the cable to the COM 1 or COM 2 DB9 port on the CM9700-MGR PC.
2. Connect the other end of the cable to the COM1 DB9 port on the CM9700-CC1.

**NOTE:** Either COM 1 or COM 2 on the CM9700-CC1 can be used for connection to the CM9700-MGR PC. COM 1 is configured at the factory for use with the CM9700-MGR PC and RS-232 communication.

Refer to Figure 4 for a diagram of null modem cable wiring connections.



**Figure 4.** CM9700-MGR PC to CM9700-CC1 Null Modem Cable Connections

### Connecting a VGA Monitor to the CM9700-CC1

When connected to the CM9700-CC1, a VGA monitor displays the CM9700-CC1 diagnostic screen (refer to *Monitoring CM9700-CC1 Functions* in the *System Diagnostics* section for detailed information about the CM9700-CC1 diagnostic screen).

Connect a VGA monitor to the VGA port of the CM9700-CC1 (refer to Figure 3).

### Connecting a PS/2 Keyboard to the CM9700-CC1

A PS/2 keyboard is supplied with the CM9700-CC1. To connect the keyboard to the CM9700-CC1, refer to Figure 3 and do the following:

1. Connect the supplied PS/2-to-AT keyboard adapter to the keyboard.
2. Connect the other end of the adapter to the AT-compatible keyboard port on the CM9700-CC1.

**NOTE:** An AT-compatible keyboard port also exists on the front of the CM9700-CC1 behind the front door. Both keyboard ports cannot be used at the same time.

### Connecting Devices to CM9700-CC1 RS-422 Serial Communication Ports

RS-422 serial communication ports 5-36, commonly referred to as SERCOM ports, are provided on the CM9700-CC1 for communication with devices such as matrix bays, keyboards, and pan/tilt or dome receivers. Before connecting devices to the SERCOM ports, note the following:

- For a new system installation, refer to the System 9760 port assignment table titled "System 9760 Factory Default Port Settings" that is provided in the System 9760 binder. The port assignment table lists the CM9700-CC1 ports and the particular device that should be connected to each port as configured at the factory for your system. For additional information about the port assignment table, refer to the *Using the System 9760 Port Assignment Table* section.
- Certain devices must be connected to SERCOM ports in a particular order based on device priority. In a new system installation that has been configured at the factory, connecting devices according to the port assignments provided in the System 9760 port assignment table ensures that you connect the correct device to the correct port.

If you add devices to an existing system, it is recommended that you configure your system using the CM9700-MGR software before connecting devices to SERCOM ports. The CM9700-MGR software automatically assigns devices to SERCOM ports in the correct order. By connecting devices according to the port assignments in CM9700-MGR, you ensure that you connect the correct device to the correct port. For detailed information about SERCOM port device priorities, refer to the *SERCOM Port Device Priority Connections* section.

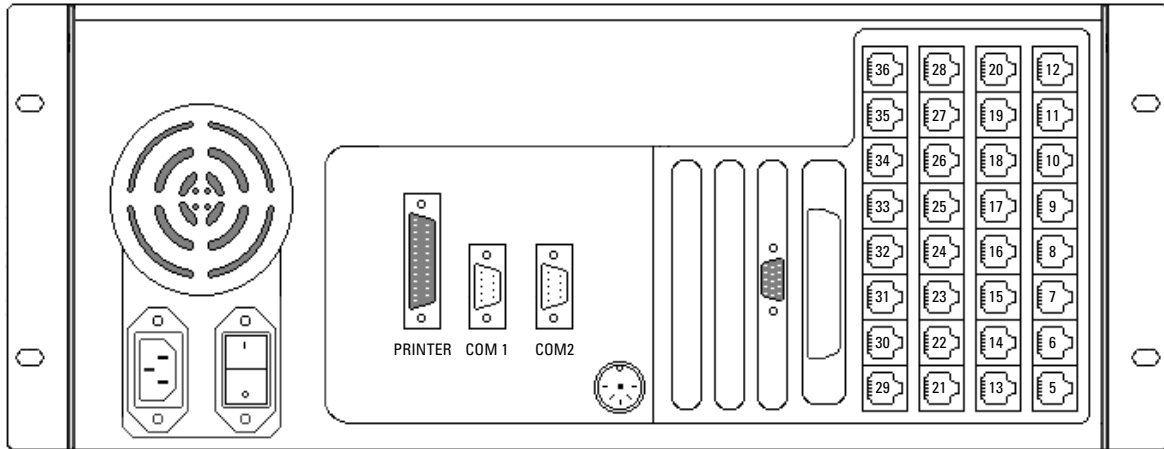
To connect a device to a SERCOM port, attach an RJ-45 data cable from the device to the appropriate SERCOM port. An RJ-45 data cable is included with each 9760 system device for connection to the CM9700-CC1. For detailed information about connecting a matrix bay to the CM9700-CC1, refer to the *Installing CM9760-MXB Matrix Bay(s)* section. For detailed information about connecting an ASCII communication device to the CM9700-CC1, refer to *Appendix A*. For detailed information about connecting other devices to the CM9700-CC1, refer to the manual supplied with the device.

**NOTE:** Shielded cabling is required to comply with CE emissions guidelines.

### Using the System 9760 Port Assignment Table

The System 9760 port assignment table, titled "System 9760 Factory Default Port Settings," lists the CM9700-CC1 port numbers (1-36) and each device that has been assigned to a particular CM9700-CC1 port and configured for your system at the factory. Figure 5 illustrates a sample port assignment table for a system containing a CM9700-MGR (System Manager) PC, three CM9760-MXBs, and one CM9760-KBD. Note that the port assignment table for your system will differ from the one shown in Figure 5 depending on the types and number of devices included in your system.

## System 9760 Factory Default Port Settings



**Note:** The number of ports on your system may differ from the above drawing. Connect System 9760 components as follows:

PORT	DESCRIPTION	PORT	DESCRIPTION
1(RS-232)	SYSTEM MANAGER	19	
2(RS-232)		20	
3	NOT AVAILABLE		
4	NOT AVAILABLE		
5	CM9760-MXB (2A) (OUTPUTS 1-16)	23	
6	CM9760-MXB (2B) (OUTPUTS 17-32)	24	
7	CM9760-MXB (2C) (OUTPUTS 33-48)	25	
8	CM9760-KBD (PIN 1111)	26	
9		27	
10		28	
11		29	
12		30	
13		31	
14		32	
15		33	
16		34	
17		35	
18		36	

**Figure 5.** Sample Port Assignment Table

In the sample port assignment table shown in Figure 5, note the following:

- CM9700-CC1 port 1 (COM 1) is assigned and configured for the System Manager; therefore, the System Manager PC should be connected to COM 1 on the CM9700-CC1.

**NOTE:** For all systems configured at the factory, COM 1 is always configured as the port to be used with the System Manager PC.

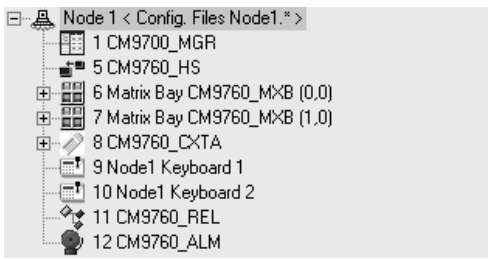
- CM9700-CC1 port 2 (COM 2) is not assigned or configured for any device.
- Because CM9700-CC1 ports 3 and 4 are not present on the CM9700-CC1, ports 3 and 4 are grayed out and are described as NOT AVAILABLE.
- CM9700-CC1 port 5 is assigned and configured for the CM9760-MXB labeled 2A containing video outputs 1-16; therefore, the CM9760-MXB labeled 2A should be connected to port 5 on the CM9700-CC1.
- CM9700-CC1 port 6 is assigned and configured for the CM9760-MXB labeled 2B containing video outputs 17-32; therefore, the CM9760-MXB labeled 2B should be connected to port 6 on the CM9700-CC1.
- CM9700-CC1 port 7 is assigned and configured for the CM9760-MXB labeled 2C containing video outputs 33-48; therefore, the CM9760-MXB labeled 2C should be connected to port 7 on the CM9700-CC1.
- CM9700-CC1 port 8 is assigned and configured for the CM9760-KBD having a pin number of 1111; therefore, the CM9760-KBD should be connected to port 8 on the CM9700-CC1.
- Because no additional devices are included in the system, CM9700-CC1 ports 9-36 are not assigned or configured for any device.

### SERCOM Port Device Priority Connections

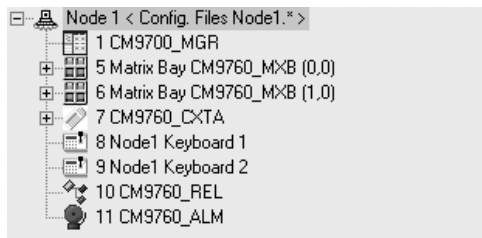
The CM9760-HS hot switch, CM9700-NW1 network interface unit (required in a networked system), and CM9760-MXB matrix bays must be connected to SERCOM ports in a particular order based on device priority. The CM9760-HS has the highest priority and, if present in the system, always connects to SERCOM port 5. The CM9700-NW1 has the next highest priority if present in the system, followed by CM9760-MXBs. If neither a CM9760-HS nor a CM9700-NW1 is present, then CM9760-MXBs have the highest priority and must be connected to the CM9700-CC1 starting at port 5. As a result, the order of connections depends on whether the system includes a CM9760-HS hot switch, a CM9700-NW1, or both. Note that CM9760-MXBs must be connected in sequential order. After all CM9760-MXBs have been connected, all other devices—such as keyboards—can then be connected in any order.

Table A, Table B, Table C, and Table D provide a list of the appropriate order of device connections to SERCOM ports in various types of systems. The tables also include the device tree view portion of the CM9700-MGR Main window. The device tree identifies the appropriate port number assigned to each device in the system.

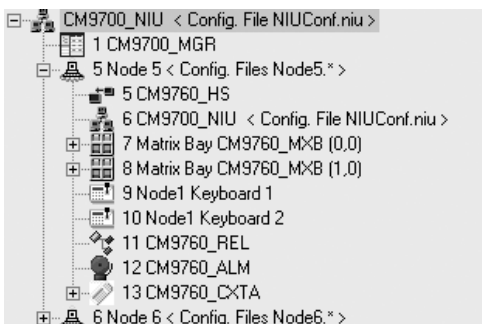
**Table A. RS-422 SERCOM Port Connections in a Single-Node System with a CM9760-HS Hot Switch**

Device	SERCOM Port Connection	CM9700-MGR Device Tree Port Assignments
CM9760-HS	Port 5	
CM9760-MXB(s)	Port 6 and next sequential ports as necessary—connected through the hot switch	
Other devices	Any available ports connected through the hot switch—connections do not have to be in sequential ports	


**Table B.** RS-422 SERCOM Port Connections in a Single-Node System without a CM9760-HS Hot Switch

Device	SERCOM Port Connection	CM9700-MGR Device Tree Port Assignments
CM9760-MXB(s)	Port 5 and next sequential ports as necessary	 <p>The device tree for Node 1 shows the following assignments: 1 CM9700_MGR, 5 Matrix Bay CM9760_MXB (0,0), 6 Matrix Bay CM9760_MXB (1,0), 7 CM9760_CXTA, 8 Node1 Keyboard 1, 9 Node1 Keyboard 2, 10 CM9760_REL, and 11 CM9760_ALM.</p>
Other devices	Any available ports—connections do not have to be in sequential ports	

**Table C.** SERCOM Port Connections in a Networked System with a CM9760-HS Hot Switch

Device	SERCOM Port Connection	CM9700-MGR Device Tree Port Assignments
CM9760-HS	Port 5	 <p>The device tree for CM9700_NIU shows the following assignments: 1 CM9700_MGR, 5 Node 5 &lt; Config. Files Node5.* &gt;, 5 CM9760_HS, 6 CM9700_NIU &lt; Config. File NIUConf.niu &gt;, 7 Matrix Bay CM9760_MXB (0,0), 8 Matrix Bay CM9760_MXB (1,0), 9 Node1 Keyboard 1, 10 Node1 Keyboard 2, 11 CM9760_REL, 12 CM9760_ALM, 13 CM9760_CXTA, and 6 Node 6 &lt; Config. Files Node6.* &gt;.</p>
CM9700-NW1 network interface unit	Port 6—connected through the hot switch	
Matrix bay(s)	Port 7 and next sequential ports as necessary—connected through the hot switch	
Other devices	Any available ports connected through the hot switch—connections do not have to be in sequential ports	

**Table D.** SERCOM Port Connections in a Networked System without a CM9760-HS Hot Switch

Device	SERCOM Port Connection	CM9700-MGR Device Tree Port Assignments
CM9700-NW1 network interface unit	Port 5 on each CM9700-CC1 in the network interface unit	 <p>The device tree for CM9700_NIU shows the following assignments: 1 CM9700_MGR, 5 Node 5 &lt; Config. Files Node5.* &gt;, 5 CM9700_NIU &lt; Config. File NIUConf.niu &gt;, 6 Matrix Bay CM9760_MXB (0,0), 7 Matrix Bay CM9760_MXB (1,0), 8 Node1 Keyboard 1, 9 Node1 Keyboard 2, 10 CM9760_REL, 11 CM9760_ALM, 12 CM9760_CXTA, and 6 Node 6 &lt; Config. Files Node6.* &gt;.</p>
Matrix bay(s)	Port 6 and next sequential ports as necessary	
Other devices	Any available ports—connections do not have to be in sequential ports	

**NOTE:** If you add matrix bays to an existing system, you may need to change existing port connections to be able to connect each additional matrix bay to the lowest sequential port possible.

### Connecting Power to the CM9700-CC1

To connect power to the CM9700-CC1, connect the supplied 120 VAC or 230 VAC power cord to the power input receptacle on the CM9700-CC1 and to an approved power source.

**NOTE:** Do not power on the CM9700-CC1 until all system devices have been connected to the CM9700-CC1 and all system devices have been powered on.

## POWERING ON THE CM9700-CC1

After all system devices have been connected to the CM9700-CC1 and all system devices have been powered on, power on the CM9700-CC1. To power on the unit, place the power switch in the On (I) position. If, for some reason, you must power off the unit, place the power switch in the Off (O) position.

## INSTALLING CM9760-MXB MATRIX BAY(S)

Your System 9760 installation may include one or multiple CM9760-MXB matrix bays. Installation of a CM9760-MXB includes the following tasks:

- Selecting a location for the CM9760-MXB in an EIA standard rack
- Mounting the CM9760-MXB
- Verifying CM9760-MXB component installation
- Connecting the CM9760-MXB to the CM9700-CC1
- Connecting power to the CM9760-MXB
- Powering on the CM9760-MXB
- Checking diagnostic LEDs
- Connecting video inputs and outputs

To perform each of the above tasks, refer to the sections that follow.

### SELECTING A LOCATION FOR THE CM9760-MXB

The CM9760-MXB is designed to be mounted into a standard 19-inch (48.26 cm) EIA rack. When selecting a location in a rack for a CM9760-MXB, note the following:

- The CM9760-MXB occupies 6 RUs or 10.5 inches (26.7 cm) of vertical rack space.
- Allow at least 1 RU or 1.75 inches (4.5 cm) of space above the CM9760-MXB for air circulation. In a high-temperature environment, it may also be necessary to provide forced air cooling. Contact Product Support for additional information.
- The maximum distance allowable between a CM9760-MXB and the CM9700-CC1 is 4,000 feet (1,219 meters). Note that a 10-foot (3.05 meters) reversed cable is supplied with the CM9760-MXB for connection to the CM9700-CC1. If you install a CM9760-MXB farther than 10 feet from the CM9700-CC1, you must create your own cable.

In addition, if you are installing multiple matrix bays, note the following:

- When expanding video inputs beyond 256 as provided by a single matrix bay, the expansion of video inputs occurs in a horizontal manner using a sideframing configuration. As a result, each additional matrix bay should be installed at the same level in a nearby rack.

When installing a new system containing multiple matrix bays to be sideframed, note that the rear of each matrix bay is labeled to identify the location of each matrix bay in the sideframe configuration. For example, the matrix bays are labeled 2A, 12A, 22A, and so on.

- When expanding video outputs beyond 16 as provided by a single matrix bay, the expansion of video outputs occurs in a vertical manner using a downframing configuration. As a result, multiple matrix bays must be installed in the same rack.

When installing a new system containing multiple matrix bays to be downframed, note that the rear of each matrix bay is labeled to identify the location of each matrix bay in the downframe configuration. For example, the matrix bays are labeled 2A, 2B, 2C, and so on.

- When expanding video inputs beyond 256 *and* video outputs beyond 16, a combination of sideframing and downframing is used.

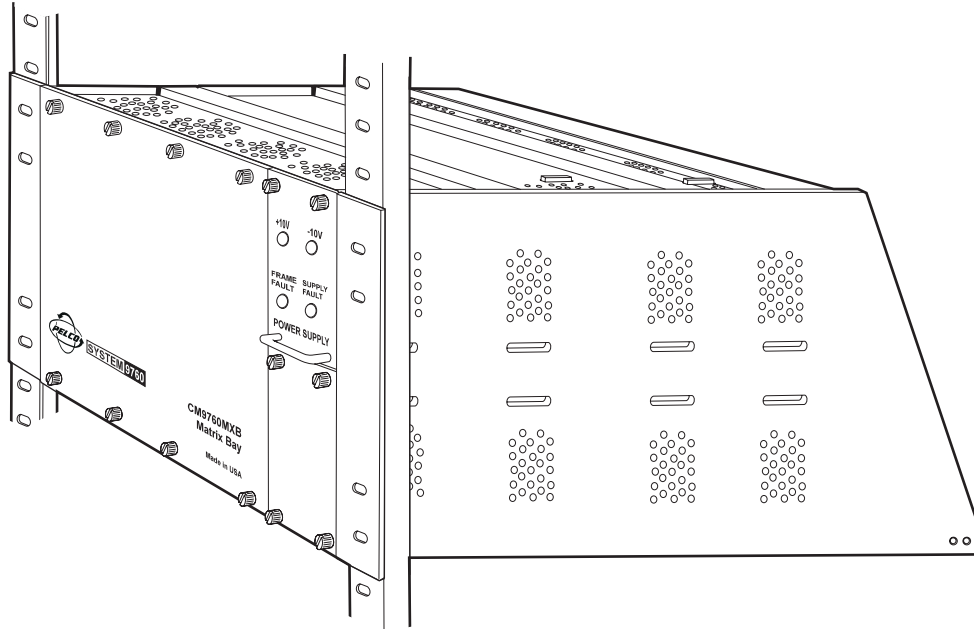
When installing a new system containing multiple matrix bays to be sideframed and downframed, note that the rear of each matrix bay is labeled to identify the location of each matrix bay in the sideframe and downframe configuration. For example, matrix bays to be side-framed are labeled 2A, 12A, 22A, and so on; and matrix bays to be downframed are labeled 2B, 12B, 22B, and so on.

To help you determine the location of multiple matrix bays in your system, refer to *Appendix B* for sample illustrations of matrix bay configurations. Note the labeling of the matrix bays shown in the sample illustrations. In addition, for detailed information about sideframing and downframing, refer to *Sideframing and Downframing* in the *CM9760-MXB Matrix Bay* section.

## MOUNTING THE CM9760-MXB

**⚠ DANGER:** Always install equipment starting from the bottom of the rack. Installing equipment starting from the top of the rack can cause the rack to topple.

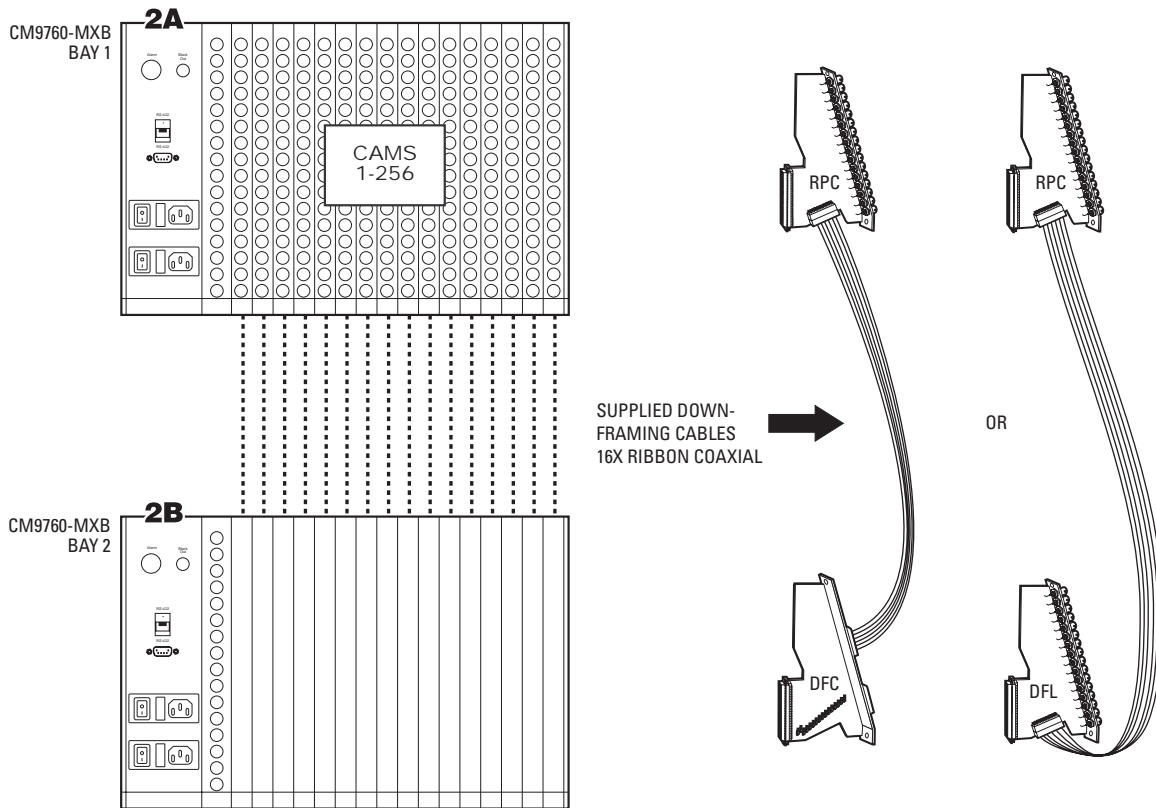
To mount a CM9760-MXB into a rack, install the CM9760-MXB into the desired location and secure the unit using the supplied mounting hardware (refer to Figure 6).



**Figure 6.** Mounting the CM9760-MXB

If you are mounting multiple matrix bays, note the following:

- If you are installing a new system, be sure to mount the matrix bays in a horizontal (sideframe) or vertical (downframe) manner according to the bay location label provided on the rear of each matrix bay (refer to the *Selecting a Location for the CM9760-MXB* section for additional information.)
- After mounting matrix bays in a downframe configuration, connect each supplied coaxial ribbon cable, referred to as a downframe cable, to downframe connectors on rear panel cards as appropriate. The downframe cables are required to connect the video inputs from one matrix bay to another. Figure 7 illustrates sample downframe cable connections between a CM9760-RPC card and a CM9760-DFC card and between a CM9760-RPC card and a CM9760-DFL card in a configuration containing one downframed bay. For additional information, refer to *Downframing* in the *CM9760-MXB Matrix Bay* section and to *Appendix B*.



**Figure 7. Sample Downframe Cable Connections**

## VERIFYING CM9760-MXB COMPONENT INSTALLATION

Up to 16 CM9760-VCC video input cards, one CM9760-VMC video output card, and up to two power supplies are installed in a matrix bay at the factory as ordered. Verify component installation as follows:

1. Remove the front panel of the matrix bay to view the video input and output cards.
2. Verify that the correct number of cards and power supplies are installed. In addition, verify that each installed card and power supply is properly seated in the matrix bay.

Refer to the following sections for detailed information.



## Removing the CM9760-MXB Front Panel

To remove the front panel of the CM9760-MXB, loosen the eight captive panel screws indicated in Figure 8.

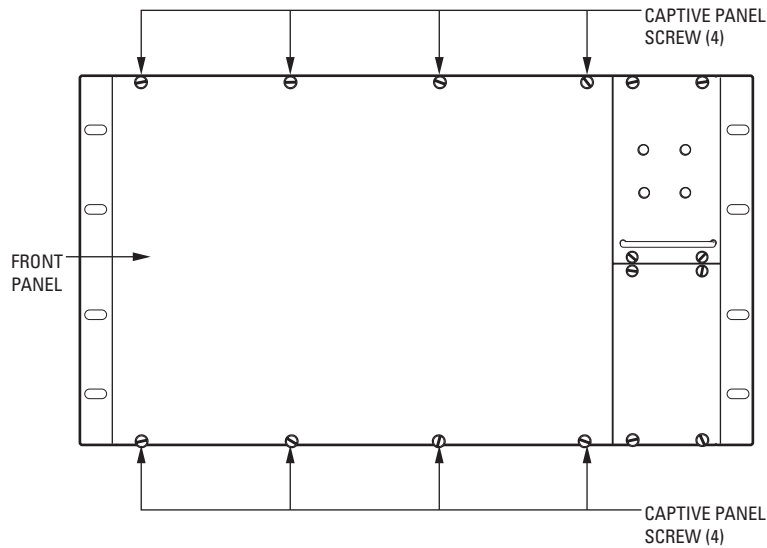


Figure 8. CM9760-MXB Front Panel

**WARNING:** Although the CM9760-MXB will function properly with the front panel removed, the front panel must be attached during system operation to meet safety standards. To reattach the front panel, tighten the eight captive panel screws.

## Verifying Input Card, Output Card, and Power Supply Installation

The CM9760-MXB accepts up to 16 CM9760-VCC video input cards in slots 1-16, one CM9760-VMC card in slot 17, and up to two power supplies (refer to Figure 9). With the front panel removed, verify that the correct number of cards are installed as ordered and that they are firmly seated in the appropriate slots. In addition, verify that the correct number of power supplies are installed as ordered and that each installed power supply is firmly seated in the power supply slot.

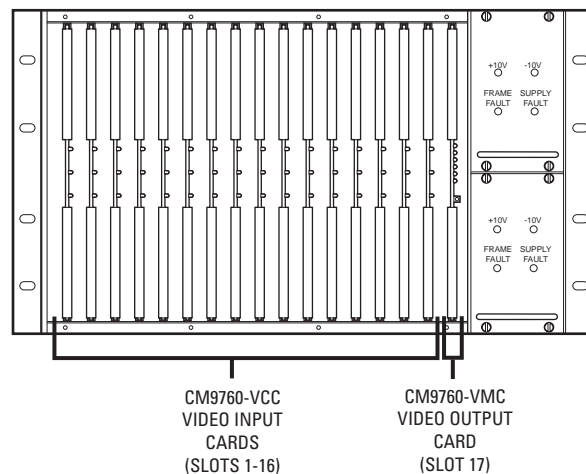


Figure 9. Sample CM9760-MXB Configuration

**NOTE:** The configuration of your CM9760-MXB may differ from the configuration shown in Figure 9 depending on the number of video input cards and power supplies ordered. If your configuration contains only one power supply, a blank plate covers the lower power supply slot.

CONNECTING THE CM9760-MXB TO THE CM9700-CC1

Connect a CM9760-MXB to the CM9700-CC1 using the 10-foot (3.05 meters) reversed cable supplied with the CM9760-MXB. If you must create a longer cable, it is recommended that you use a 24-gauge twisted pair cable.

As illustrated in Figure 10, connect the female RJ-45 serial communications data port labeled RS-422 on the rear of the CM9760-MXB to the appropriate female RJ-45 serial communications port (RS-422) on the rear of the CM9700-CC1. Figure 10 provides an example of a CM9760-MXB connected to port 5 on the CM9700-CC1.

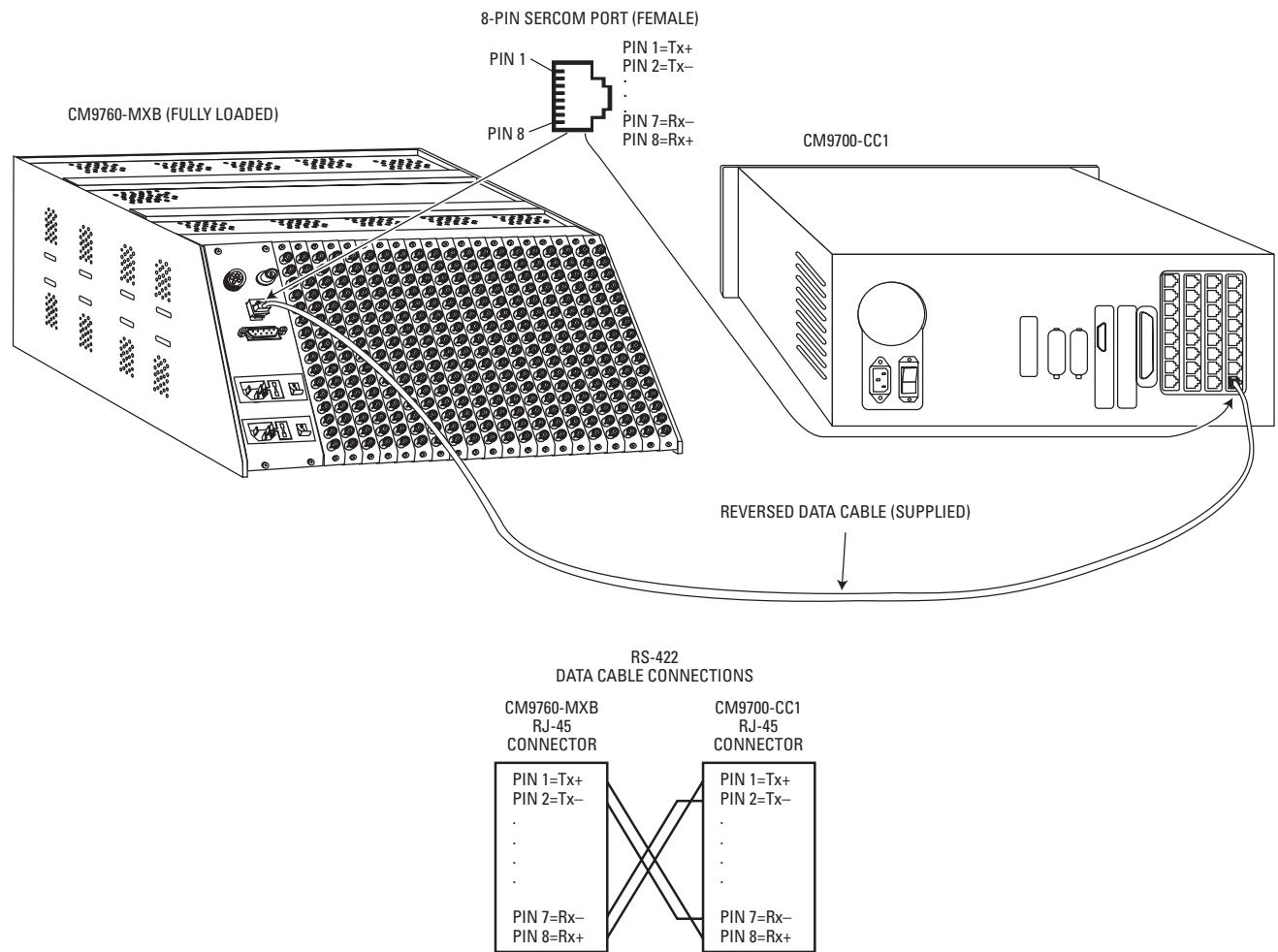
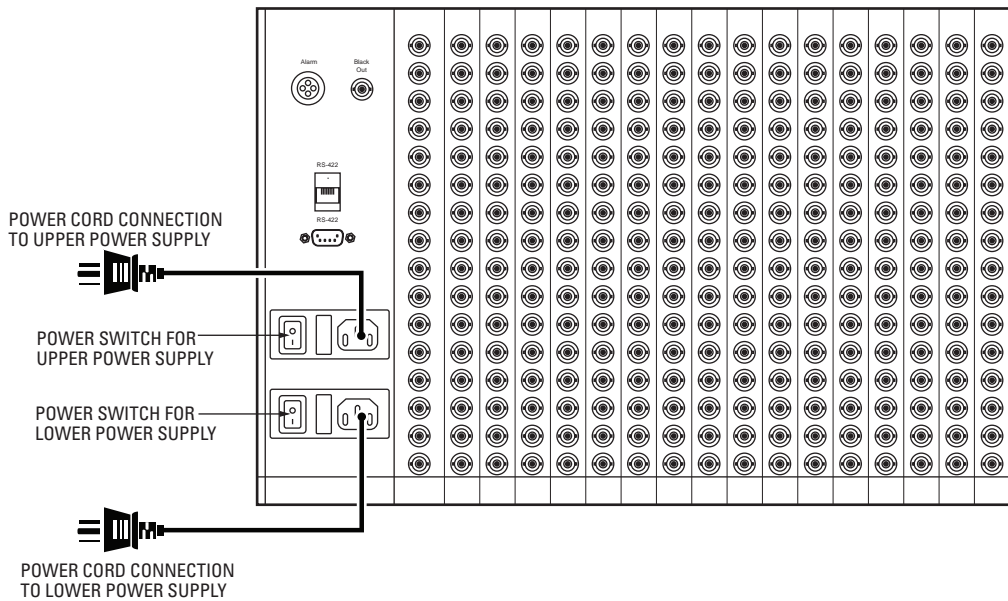


Figure 10. CM9760-MXB to CM9700-CC1 Connection

## CONNECTING POWER TO THE CM9760-MXB

**NOTE:** A CM9760-MXB operates on 120 VAC, 60 Hz. A CM9760-MXB-X operates on 230 VAC, 50 Hz.

To connect power to a CM9760-MXB, plug the supplied power cord into the power input receptacle on the rear of the matrix bay for each power supply installed (refer to Figure 11). Then plug the power cord for each installed power supply into an approved power source.



**Figure 11.** CM9760-MXB Power Connections (Two Power Supplies Installed)

## POWERING ON THE CM9760-MXB

**NOTE:** Do not power on the CM9760-MXB until after it is connected to the CM9700-CC1.

To power on a CM9760-MXB, place the corresponding power switch of each installed power supply in the On (I) position. If, for some reason, you must power off the CM9760-MXB, place the corresponding power switch of each installed power supply in the Off (O) position.

## CHECKING DIAGNOSTIC LEDs

Checking the diagnostic LEDs on a CM9760-MXB allows you to ensure that the unit is operating properly. It is recommended that you check the LEDs on the CM9760-MXB before connecting video inputs and outputs to the unit.

With the CM9760-MXB powered on, check the LEDs as follows:

1. For each power supply installed, do the following:
  - a. Verify that the +10V and –10V power LEDs are lit (green).

If a power LED is not lit, ensure that the power supply is seated properly. If the condition persists, inspect the power supply fuse and replace the fuse if necessary (refer to *Replacing a Power Supply Fuse* in the *CM9760-MXB Component Installation or Replacement* section for detailed instructions).

- b. Verify that the Frame Fault and the Supply Fault LEDs are not lit.

If the Frame Fault LED is lit (red), one or more video input/output cards has failed. Continue with step 2 for troubleshooting information.

If the Supply Fault LED is lit (red), replace the power supply (refer to *Replacing a Power Supply* in the *CM9760-MXB Component Installation or Replacement* section for detailed instructions).

2. With the front panel of the CM9760-MXB removed, check the LEDs on the CM9760-VCC video input cards and on the CM9760-VMC video output card as follows (refer to Figure 12):

- a. Verify that all +10 VDC and -10 VDC power LEDs are lit (green).

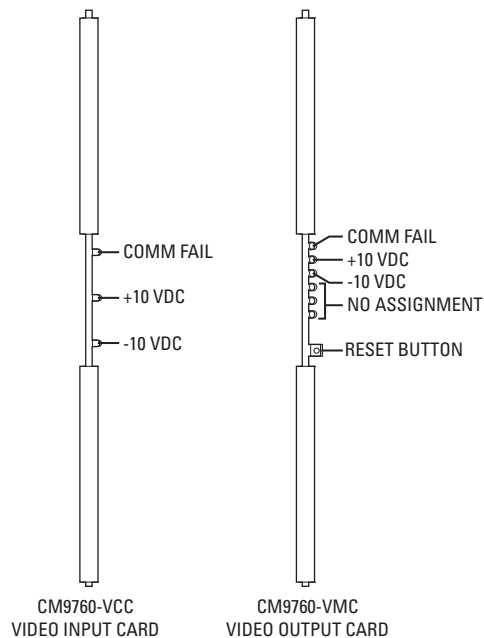
If a power LED is not lit, remove the card and inspect the fuses (refer Figure 13 for fuse locations on CM9760-VCC and CM9760-VMC cards). Replace fuse(s) if necessary. If the condition continues, replace the card. For instructions to replace a CM9760-VCC or CM9760-VMC card, refer to *Replacing a CM9760-VCC Card* or to *Replacing a CM9760-VMC Card* in the *CM9760-MXB Component Installation or Replacement* section as applicable.

- b. Verify that all Comm Fail LEDs are not lit:

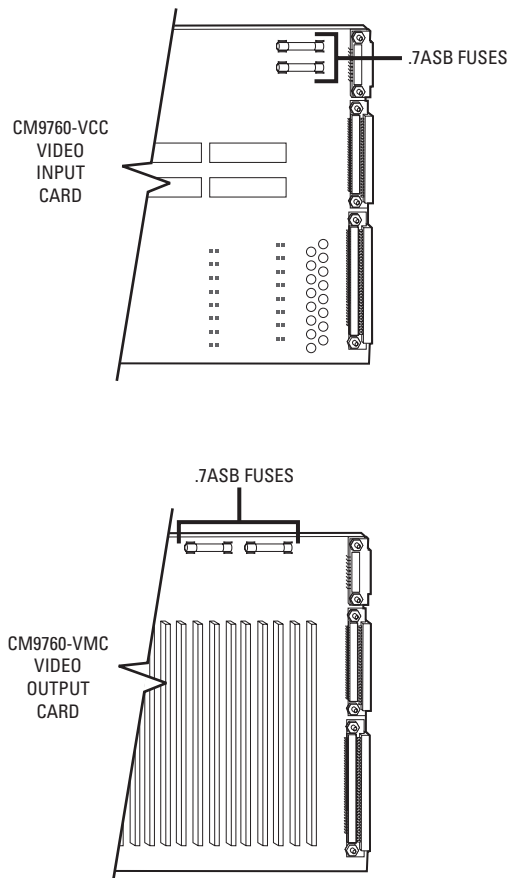
- If the LED is lit (red) on any video input card, reseal the card. If the condition continues, replace the card.
- If the Comm Fail LED is lit (red) on the video output card only, check the communication to the CM9700-CC1.
- If all Comm Fail LEDs are lit (red), press the Reset button located on the video output card (refer to Figure 12). If the problem continues, replace the video output card.

For a summary of troubleshooting information relating to the CM9760-MXB, refer to *Troubleshooting the CM9760-MXB* in the *Troubleshooting* section.

After you have verified that the CM9760-MXB is operating properly, reattach the front panel of the CM9760-MXB. Then connect video inputs and outputs (refer to the *Connecting Video Inputs and Video Outputs* section).



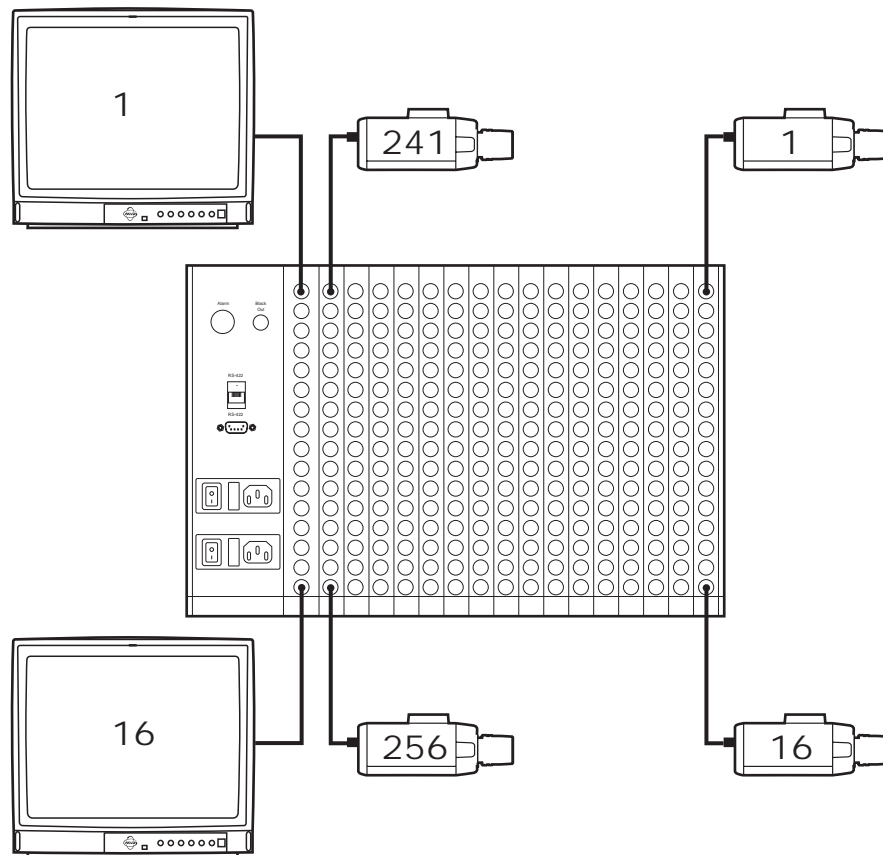
**Figure 12.** CM9760-VCC and CM9760-VMC Diagnostic LEDs



**Figure 13.** Fuse Locations on CM9760-VCC and CM9760-VMC Cards

## CONNECTING VIDEO INPUTS AND VIDEO OUTPUTS

Connect all video inputs (up to 256) and all video outputs (up to 16) to the rear panel BNC cards (refer to Figure 14).



**Figure 14. CM9760-MXB Video Input and Output Connections**

Note the following:

- To provide adequate ground and signal connections, use crimp-on BNCs rather than screw-on BNCs.
- Allow enough slack in a cable to act as a strain relief between the cable and the BNC connectors.
- Be sure each connection is secure.
- Label all cabling to minimize system downtime if troubleshooting becomes necessary and cabling needs to be disconnected.
- Video output from the CM9760-VMC video output card is not terminated. Terminate the video signal at the output device (for example, monitor, VCR, or matrix switcher). If you are looping to other devices, terminate the last device only.
- The endpoint of any video cable run must be terminated in 75 ohms.
- For information about sideframing video inputs and downframing video outputs, refer to *Sideframing and Downframing* in the *CM9760-MXB Matrix Bay* section.

## VERIFYING SYSTEM OPERATION

After installation of the 9760 system is complete, verify system operation. To do so, perform the following from a CM9760-KBD:

1. Verify that the CM9760-KBD LCD displays the following:

SYSTEM 97XX

**NOTE:** Depending on the version of the CM9760-KBD software, the LCD displays SYSTEM 9760 or SYSTEM 9700.

2. Enter the default operator password on the CM9760-KBD keypad: The default password for operator 1 is 0101; the default password for operator 2 is 0202; the default password for operator 3 is 0303, and so on. The passwords are defined in the Operator PIN field in CM9700-MGR.

The LCD displays the following:

ENTER MONITOR #

3. Enter the number of the monitor you are viewing—for example, 1—and then press the MON key.
4. Enter a camera number, and then press the CAM key.
5. Press the FWD key to advance through cameras and verify switching.

For detailed information about 9760 system operation using the CM9760-KBD, refer to the CM9760-KBD/KBR Keyboard Installation/Operation manual.

# CM9700-CC1 Component Installation or Replacement

## **WARNINGS:**

- Installation or replacement of CM9700-CC1 components should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing or replacing CM9700-CC1 components. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

This section provides information about the following:

- Removing the top cover of the CM9700-CC1 (the top cover must be removed before CM9700-CC1 components can be installed or replaced)
- Installing or replacing a CM9700-SER card

For information about replacing the VGA card (CM9700-CC1-VID) in the CM9700-CC1, refer to the CM9700-CC1-VID VGA Video Card Installation manual. For information about adding CM9700-SER-32 port expander units to the CM9700-CC1, refer to the CM9700-SER-32 Port Expander Installation/Operation manual.

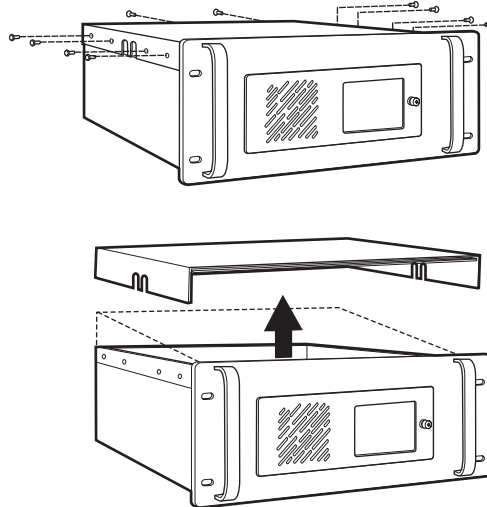
## REMOVING THE CM9700-CC1 TOP COVER

To remove the top cover of the CM9700-CC1, refer to Figure 15 and do the following:

1. Power off the CM9700-CC1.

 **WARNING:** Failure to power off the CM9700-CC1 can result in serious damage to the equipment.

2. Remove the ten screws that hold the top cover in place.
3. Tilt the top cover up at a slight angle as indicated by the dotted line in Figure 15, and then pull the cover backwards to remove the cover from the front edge of the CM9700-CC1 chassis.



**Figure 15.** CM9700-CC1 Top Cover Removal



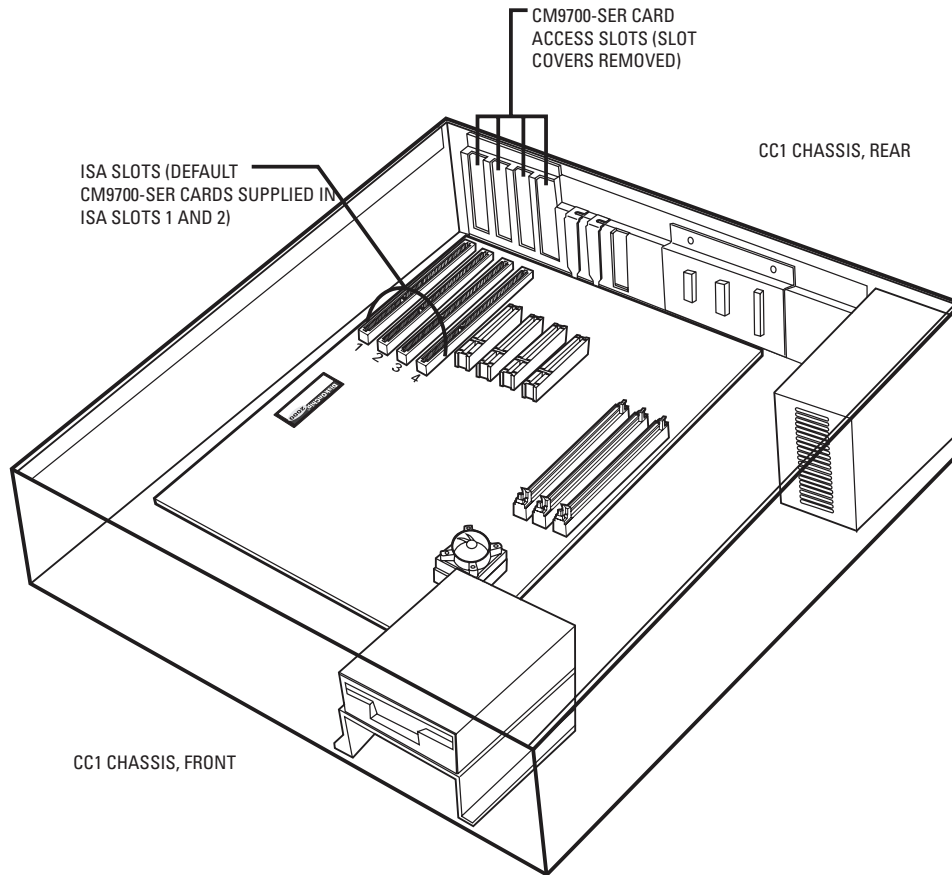
## INSTALLING OR REPLACING A CM9700-SER CARD



### WARNINGS:

- CM9700-SER card installation or replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing or replacing a CM9700-SER card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

The CM9700-CC1 is shipped from the factory with a minimum of two CM9700-SER cards installed on the motherboard in ISA slots 1 and 2 (refer to Figure 16). You can install additional CM9700-SER cards into ISA slots 3 and 4, totaling a maximum of four cards. You can also replace an existing card. When installing or replacing a CM9700-SER card, you must set the interrupt and address jumpers on the new card.



**Figure 16.** CM9700-CC1 with Top Cover Removed

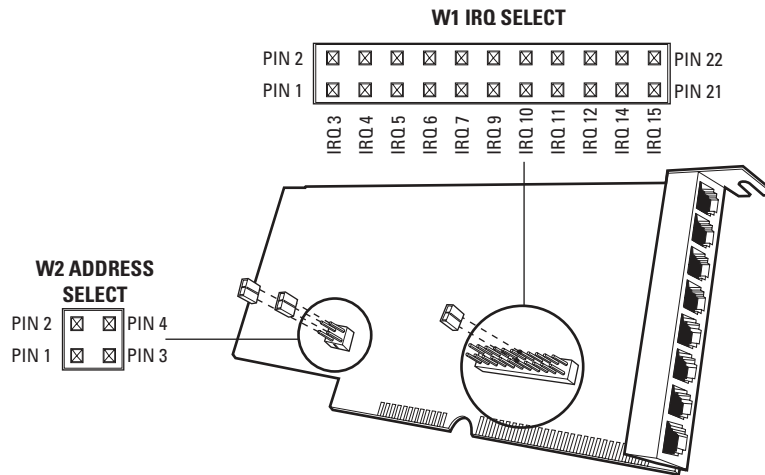
To install or replace a CM9700-SER card, do the following:

1. Power off the CM9700-CC1.



**WARNING:** Failure to power off the CM9700-CC1 can result in serious damage to the equipment.

2. Remove the top cover of the CM9700-CC1 (refer to the *Removing the CM9700-CC1 Top Cover* section).
3. If replacing an existing CM9700-SER card, remove the card from the ISA slot.
4. On the new CM9700-SER card, set the W1 interrupt (IRQ) and W2 address select jumpers (refer to Figure 17 and to Table E). Note that the jumper settings vary depending on the ISA slot into which the card is to be installed. If you are replacing a card, the jumper settings should match the settings on the card being replaced.



**Figure 17.** Sample CM9700-SER Card Jumper Assignments

**Table E.** CM9700-SER Card Jumper Assignments

ISA Slot Number	W1 IRQ Setting	W2 Address Setting
1	IRQ 10	Pins 1 to 2 and 3 to 4
2	IRQ 11	Pins 1 to 2 only
3	IRQ 12	Pins 3 to 4 only
4*	IRQ 5	No jumpers
*The jumper assignments shown for ISA slot 4 are applicable to the CM9700-CC1 but are not applicable to the CM9700-NW1. A maximum of three CM9700-SER cards can be installed into the CM9700-NW1 (ISA slots 1, 2, and 3). The CM9700-NW1 is shipped from the factory with a minimum of one CM9700-SER card installed into ISA slot 1.		

5. Install the new CM9700-SER card into the desired slot.
6. Reattach the front cover of the CM9700-CC1.
7. Power on the CM9700-CC1.

Note the following:

- You can cycle through the IRQ/address settings by toggling the ALT+A key combination on the PC keyboard associated with the CM9700-CC1 diagnostic screen. (For information about the CM9700-CC1 diagnostic screen, refer to the *System Diagnostics* section.)
- When connecting system devices to the serial communication ports of the CM9700-SER card, shielded cabling is required to comply with CE emissions guidelines.

# CM9760-MXB Component Installation or Replacement

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## **WARNINGS:**

- Installation or replacement of CM9760-MXB components should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing or replacing CM9760-MXB components. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

This section provides information about the following:

- Installing or replacing rear panel cards (CM9760-RPC, CM9760-RPL, CM9760-DFC, CM9760-DFL, and CM9760-RPM)
- Installing or replacing a CM9760-VCC video input card
- Installing or replacing a CM9760-VMC video output card
- Installing a CM9760-VMM module on a CM9760-VMC video output card
- Installing or replacing a power supply
- Replacing a power supply fuse

In addition, this section also provides information about enabling/disabling the power supply alarm.

## INSTALLING OR REPLACING REAR PANEL CARDS

CM9760-RPC, CM9760-RPL, CM9760-DFC, CM9760-DFL, and CM9760-RPM cards are installed into the rear of the matrix bay. For an initial system installation, the cards are installed at the factory as ordered. Rear panel cards (and associated front panel cards) can be added to expand a system or can be replaced if necessary.

**NOTE:** Rear panel cards must be installed *before* the associated CM9760-VCC video input card or CM9760-VMC video output card is installed into the front of the matrix bay.

### INSTALLING OR REPLACING A CM9760-RPC REAR PANEL INPUT CARD

Up to 16 CM9760-RPC cards can be installed into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards to be installed. If necessary, a CM9760-RPC card can be replaced. To install or replace a CM9760-RPC card, refer to the sections that follow.

#### Installing a CM9760-RPC Card

## **WARNINGS:**

- Rear panel card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** A CM9760-RPC card must be installed *before* the associated CM9760-VCC video input card is installed.

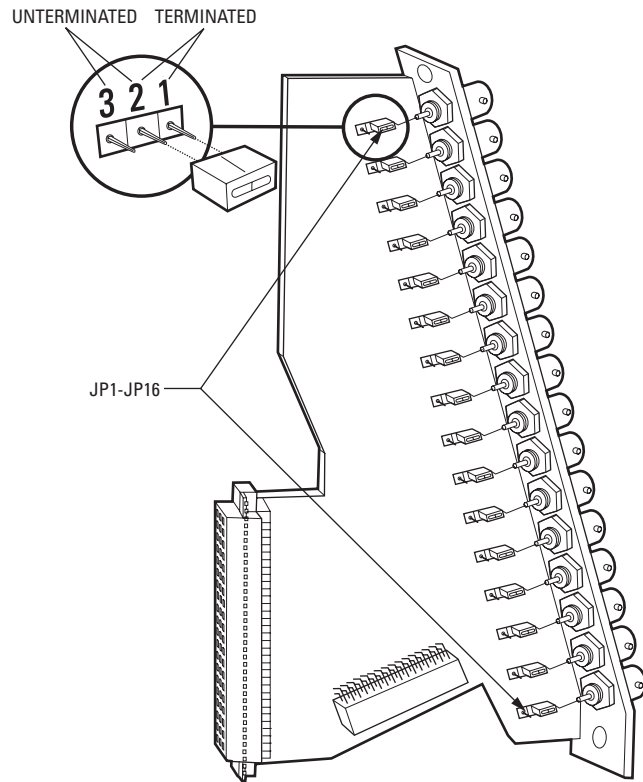
To install a CM9760-RPC card, do the following:

1. Set termination jumpers JP1-JP16 (refer to Figure 18) in the proper position:
  - In a single-bay configuration, the setting of the jumpers depends on whether video is to be looped to another device (for example, a DVR, VCR, or matrix switcher):
    - When looping is not required, set the jumpers in the terminated position ( jumper positions 1 and 2) (default setting).
    - When looping is required, set the jumpers in the unterminated position ( jumper positions 2 and 3).
  - In multiple-bay configurations, set the jumpers in the unterminated position.
2. Locate the desired slot position at the rear of the bay.

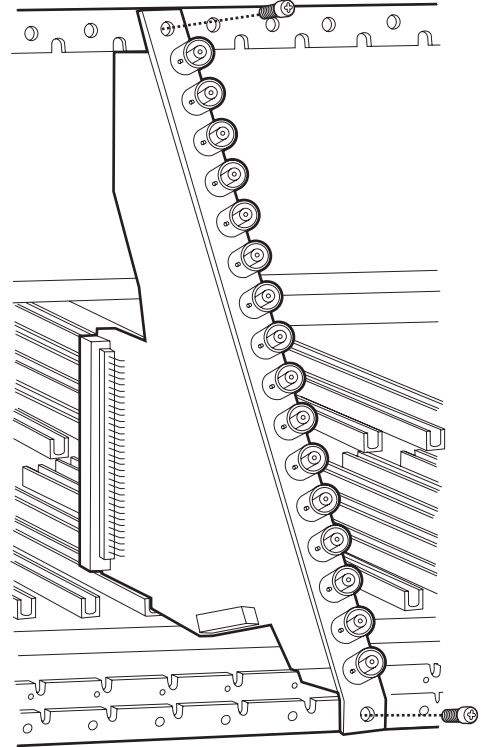
**NOTE:** The physical number of a video input is determined by the position of the CM9760-VCC card, which is installed into the front of the matrix bay. Viewed from the rear of the matrix bay, slot 1 is located on the right and corresponds to physical input numbers 1-16, slot 2 corresponds to physical input numbers 17-32, and so on. As a result, if you do not install CM9760-RPC cards in sequential order, be sure to use the correct physical input number when programming the system using the CM9700-MGR.

3. Remove the blank cover plate by loosening the screw at the top and bottom of the plate.

4. Slide the new card into the card guides (refer to Figure 19).
5. Push the card into place firmly.
6. Tighten the screw at the top and bottom of the card.
7. Connect BNC and downframe cables as applicable.



**Figure 18.** Termination Jumpers on CM9760-RPC Rear Panel Input Card



**Figure 19.** CM9760-RPC Rear Panel Input Card Installation

## Replacing a CM9760-RPC Card



### WARNINGS:

- Rear panel card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** Before replacing a CM9760-RPC card, you must remove the front panel of the matrix bay and disconnect the associated CM9760-VCC video input card from the connectors on the backplane and from the connector on the CM9760-RPC card that is to be replaced. To disconnect the CM9760-VCC card, grasp the two card handles and firmly pull the card toward you until the card is disconnected (refer to the *Installing or Replacing a CM9760-VCC Video Input Card* section for additional information).

To replace a CM9760-RPC card, do the following:

1. Ensure that the associated CM9760-VCC video input card is disconnected as noted above.
2. Disconnect BNC and downframe cables, as applicable, from the CM9760-RPC card being replaced.
3. Remove the CM9760-RPC card by loosening the screw at the top and bottom of the card and then pulling the card toward you until it is out of the frame.
4. Install the new CM9760-RPC card (refer to the *Installing a CM9760-RPC Card* section). Note that you should set the termination jumpers on the new card to match the jumper positions on the card being replaced.

After the CM9760-RPC card has been replaced, reconnect the associated CM9760-VCC card by sliding the card toward the rear of the matrix bay until the card is seated firmly with the backplane connectors and the CM9760-RPC connector. Note that, unless the audible alarm on the power supply has been disabled, the alarm beeps twice and the Frame Fault LED flashes red twice. Then reattach the front panel of the matrix bay.

## INSTALLING OR REPLACING A CM9760-RPL REAR PANEL LOOPING CARD

The CM9760-RPL rear panel looping card contains two rows of BNC connectors and therefore occupies two slot positions in the matrix bay. The CM9760-RPL card connects to one CM9760-VCC video input card, which is installed into the front of the matrix bay. Up to eight CM9760-RPL cards can be installed when a maximum of 128 video inputs is required in a system that also requires looping. If necessary, a CM9760-RPL card can be replaced. To install or replace a CM9760-RPL card, refer to the sections that follow.

### Installing a CM9760-RPL Card

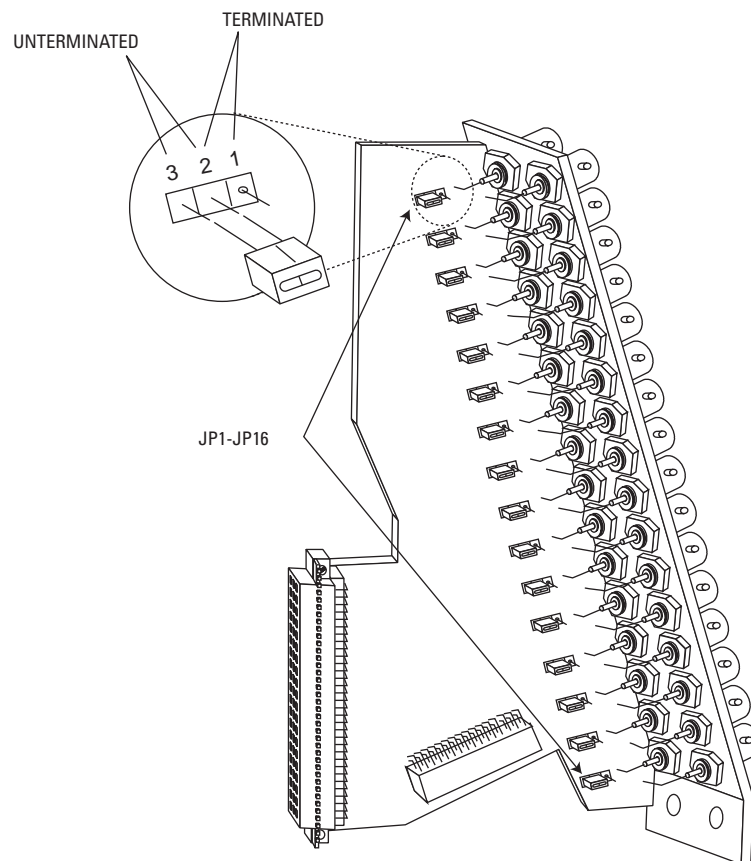
#### WARNINGS:

- Rear panel card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** A CM9760-RPL card must be installed *before* the associated CM9760-VCC video input card is installed.

To install a CM9760-RPL card, do the following:

1. Set termination jumpers JP1-JP16 (refer to Figure 20) in the proper position:
  - When looping functions are required, set the jumpers in the unterminated position (positions 2 and 3).
  - When looping functions are not required, set the jumpers in the terminated position (positions 1 and 2).

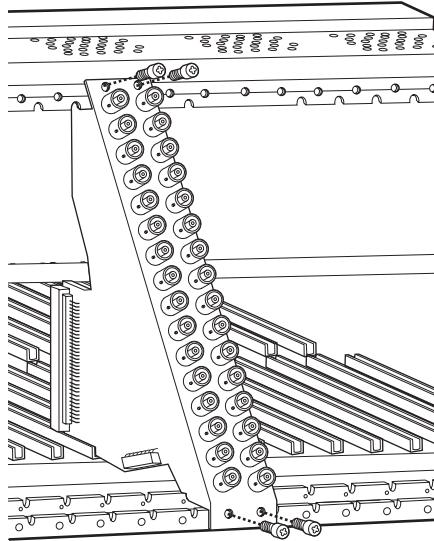


**Figure 20.** Termination Jumpers on CM9760-RPL Card

2. Locate the desired slot position at the rear of the bay.

**NOTE:** In a bay that is to be fully populated with CM9760-RPL cards, each card must be installed into an odd slot position only. The corresponding CM9760-VCC cards must also occupy odd slot positions.

3. Remove the blank cover plate by loosening the screw at the top and bottom of the plate.
4. Slide the new card into the card guides (refer to Figure 21).



**Figure 21.** CM9760-RPL Rear Panel Looping Card Installation

5. Push the card into place firmly.
6. Tighten the two screws at the top and bottom of the card.
7. Connect BNC and downframe cables as applicable.

## Replacing a CM9760-RPL Card

### **WARNINGS:**

- Rear panel card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** Before replacing a CM9760-RPL card, you must remove the front panel of the matrix bay and disconnect the associated CM9760-VCC video input card from the connectors on the backplane and from the connector on the CM9760-RPL card that is to be replaced. To disconnect the CM9760-VCC card, grasp the two card handles and firmly pull the card toward you until the card is disconnected (refer to the *Installing or Replacing a CM9760-VCC Video Input Card* section for additional information).

To replace a CM9760-RPL card, do the following:

1. Ensure that the associated CM9760-VCC video input card is disconnected as noted above.
2. Disconnect BNC and downframe cables, as applicable, from the CM9760-RPL card being replaced.
3. Remove the CM9760-RPL card by loosening the two screws at the top and bottom of the card and then pulling the card toward you until it is out of the frame.
4. Install the new card (refer to the *Installing a CM9760-RPL Card* section). Note that you should set termination jumpers on the new card to match the jumper positions on the card being replaced.

After the CM9760-RPL card has been replaced, reconnect the associated CM9760-VCC card by sliding the card toward the rear of the matrix bay until the card is seated firmly with the backplane connectors and CM9760-RPL connector. Note that, unless the audible alarm on the power supply has been disabled, the alarm beeps twice and the Frame Fault LED flashes red twice. Then reattach the front panel of the matrix bay.

## INSTALLING OR REPLACING A CM9760-DFC DOWNFRAME CARD

The CM9760-DFC card is installed in every bay between the first and last bays in a downframe configuration. The card can also be used in the last bay if looping is not required. Up to 16 CM9760-DFC cards can be installed into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards to be installed. If necessary, a CM9760-DFC card can be replaced. To install or replace a CM9760-DFC card, refer to the sections that follow.

### Installing a CM9760-DFC Card

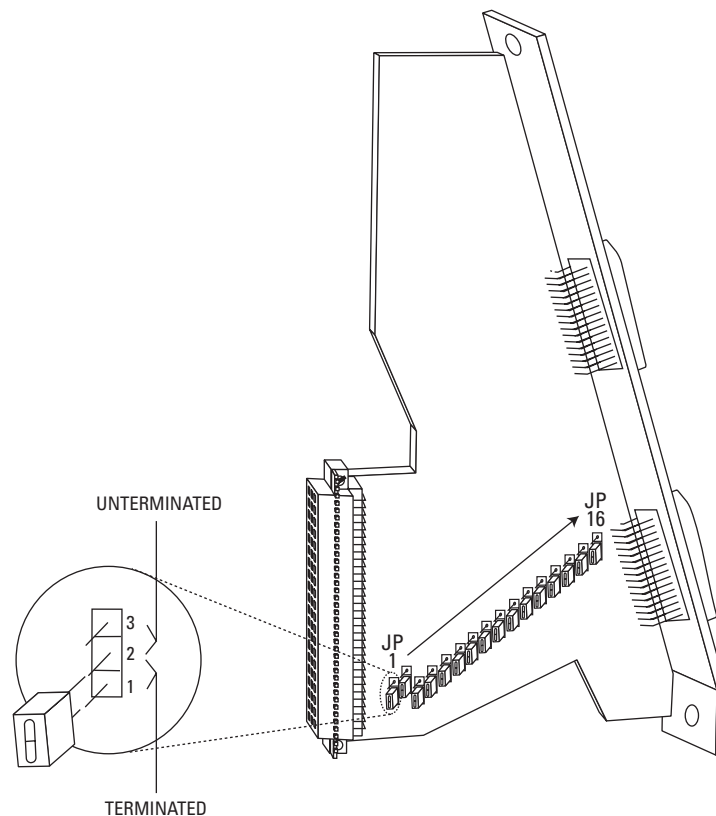
#### **WARNINGS:**

- Rear panel card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** A CM9760-DFC card must be installed *before* the associated CM9760-VCC video input card is installed.

To install a CM9760-DFC card, do the following:

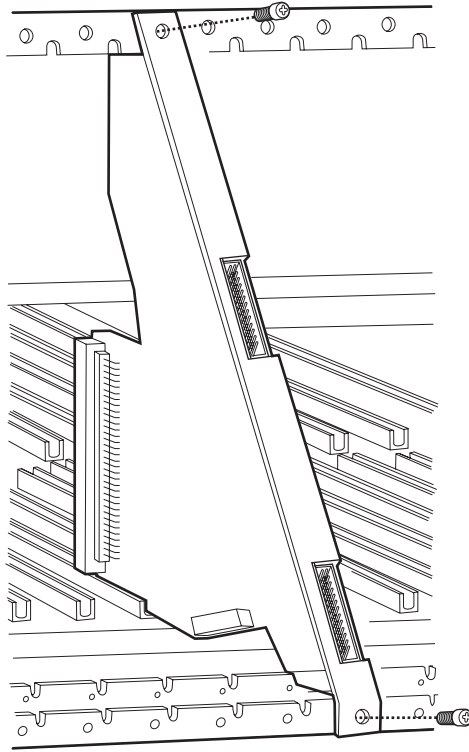
1. Set termination jumpers JP1-JP16 (refer to Figure 22) in the proper position:
  - When CM9760-DFC cards are to be installed in intermediate bays, set the jumpers in the unterminated position ( jumper positions 2 and 3).
  - When CM9760-DFC cards are to be installed in the last bay, set the jumpers in the terminated position ( jumper positions 1 and 2).



**Figure 22.** Termination Jumpers on CM9760-DFC Downframe Card

2. Locate the desired slot position at the rear of the bay.
3. Remove the blank cover plate by loosening the screw at the top and bottom of the plate.
4. Slide the new card into the card guides (refer to Figure 23).





**Figure 23. CM9760-DFC Downframe Card Installation**

5. Push the card into place firmly.
6. Tighten the screw at the top and bottom of the card.
7. Connect downframe cables as applicable.

## Replacing a CM9760-DFC Card



### WARNINGS:

- Rear panel card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** Before replacing a CM9760-DFC card, you must remove the front panel of the matrix bay and disconnect the associated CM9760-VCC video input card from the connectors on the backplane and from the connector on the CM9760-DFC card that is to be replaced. To disconnect the CM9760-VCC card, grasp the two card handles and firmly pull the card toward you until the card is disconnected (refer to the *Installing or Replacing a CM9760-VCC Video Input Card* section for additional information).

To replace a CM9760-DFC card, do the following:

1. Ensure that the associated CM9760-VCC video input card is disconnected as noted above.
2. Disconnect downframe cables, as applicable, from the CM9760-DFC card being replaced.
3. Remove the CM9760-DFC card by loosening the screw at the top and bottom of the card and then pulling the card toward you until it is out of the frame.
4. Install the new card (refer to the *Installing a CM9760-DFC Card* section). Note that when setting the termination jumpers on the new card, the jumper positions should match the jumper positions on the card being replaced.

After the CM9760-DFC has been replaced, reconnect the associated CM9760-VCC card by sliding the card toward the rear of the matrix bay until the card is seated firmly with the backplane connectors and CM9760-DFC connector. Note that, unless the audible alarm on the power supply has been disabled, the alarm beeps twice and the Frame Fault LED flashes red twice. Then reattach the front panel of the matrix bay.

## INSTALLING OR REPLACING A CM9760-DFL DOWNFRAME LOOPING CARD

The CM9760-DFL downframe looping card is used in the last bay in a downframe configuration. Note the following:

- In a CM9760-MXB(-X), the CM9760-DFL card connects to a CM9760-VCC video input card, which is installed into the front of the matrix bay. Up to 16 CM9760-DFL cards can be installed into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards to be installed.
- In a CM9760-MXBL, up to 16 CM9760-DFL cards can be installed into slot positions that correspond to the video input slot positions in the bay above. In the CM9760-MXBL, the CM9760-DFL cards do not connect to CM9760-VCC cards.

If necessary, a CM9760-DFL card can be replaced. To install or replace a CM9760-DFL card, refer to the sections that follow.

### Installing a CM9760-DFL Card

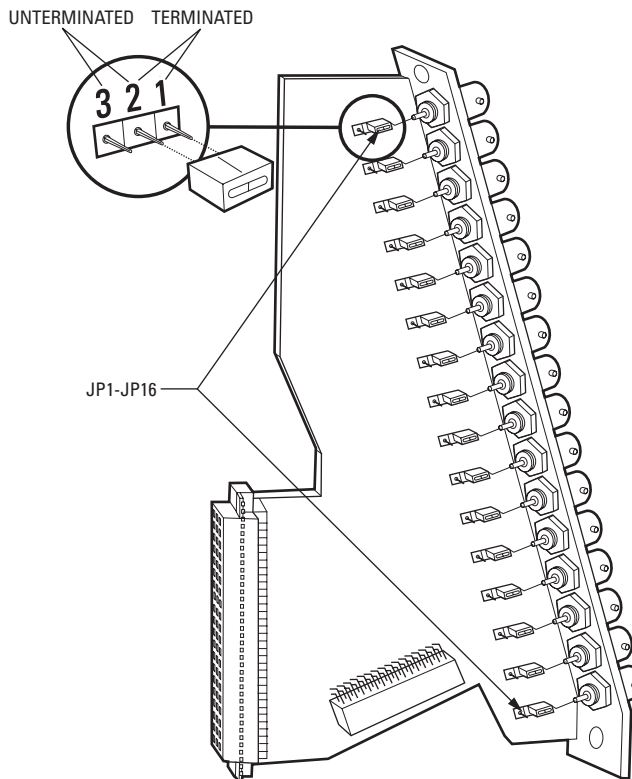
#### ⚠ WARNINGS:

- Rear panel card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** When a CM9760-DFL card is to be connected to a CM9760-VCC video input card, the CM9760-DFL card must be installed *before* the associated CM9760-VCC card is installed.

To install a CM9760-DFL card, do the following:

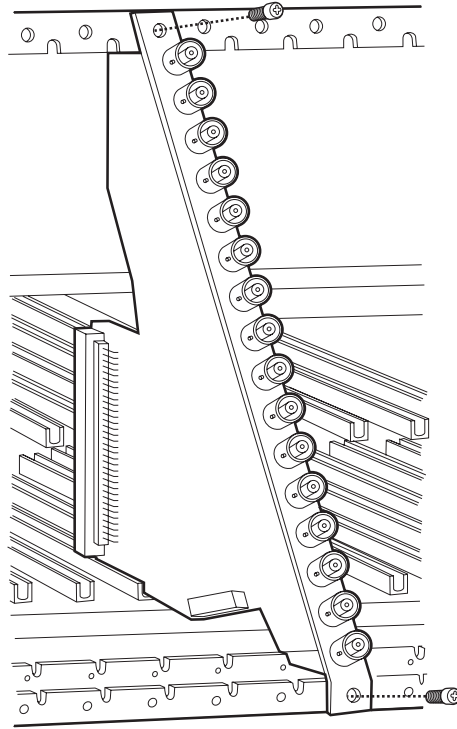
1. Set termination jumpers JP1-JP16 (refer to Figure 24) in the proper position:
  - When looping to another device is required, set the jumpers in the unterminated position (jumper positions 2 and 3). Termination must occur at the final device.
  - When looping is not required, set the jumpers in the terminated position (jumper positions 1 and 2).



**Figure 24.** Termination Jumpers on CM9760-DFL Card

2. Locate the desired slot position at the rear of the bay.
3. Remove the blank cover plate by loosening the screw at the top and bottom of the plate.

- Slide the new card into the card guides (refer to Figure 25).



**Figure 25.** CM9760-DFL Downframe Looping Card Installation

- Push the card into place firmly.
- Tighten the screw at the top and bottom of the card.
- Connect BNC and downframe cables as applicable.

## Replacing a CM9760-DFL Card



### WARNINGS:

- Rear panel card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** Before replacing a CM9760-DFL card in a CM9760-MXB(-X), you must remove the front panel of the matrix bay and disconnect the associated CM9760-VCC video input card from the connectors on the backplane and from the connector on the CM9760-DFL card that is to be replaced. To disconnect the CM9760-VCC card, grasp the two card handles and firmly pull the card toward you until the card is disconnected (refer to the *Installing or Replacing a CM9760-VCC Video Input Card* section for additional information).

To replace a CM9760-DFL card, do the following:

- CM9760-MXB(-X) only:* Ensure that the associated CM9760-VCC video input card is disconnected as noted above.
- Disconnect BNC and downframe cables, as applicable, from the CM9760-DFL card being replaced.
- Remove the CM9760-DFL card by loosening the screw at the top and bottom of the card and then pulling the card toward you until it is out of the frame.
- Install the new card (refer to the *Installing a CM9760-DFL Card* section). Note that when setting the termination jumpers on the new card, you should match the jumper positions on the card being replaced.

*CM9760-MXB(-X) only:* After the CM9760-DFL has been replaced, reconnect the associated CM9760-VCC card by sliding the card toward the rear of the matrix bay until the card is seated firmly with the backplane connectors and CM9760-DFL connector. Note that, unless the audible alarm on the power supply has been disabled, the alarm beeps twice and the Frame Fault LED flashes red twice. Then reattach the front panel of the matrix bay.

## INSTALLING OR REPLACING A CM9760-RPM REAR PANEL OUTPUT CARD

Only one CM9760-RPM card can be installed into the rear of the matrix bay. The card must always be installed into the leftmost slot. From the rear of the bay, the leftmost slot provides the connection point for the CM9760-VMC video output card, which is always installed into slot 17 in the front of the bay. If necessary, a CM9760-RPM card can be replaced. To install or replace a CM9760-RPM card, refer to the sections that follow.

### Installing a CM9760-RPM Card

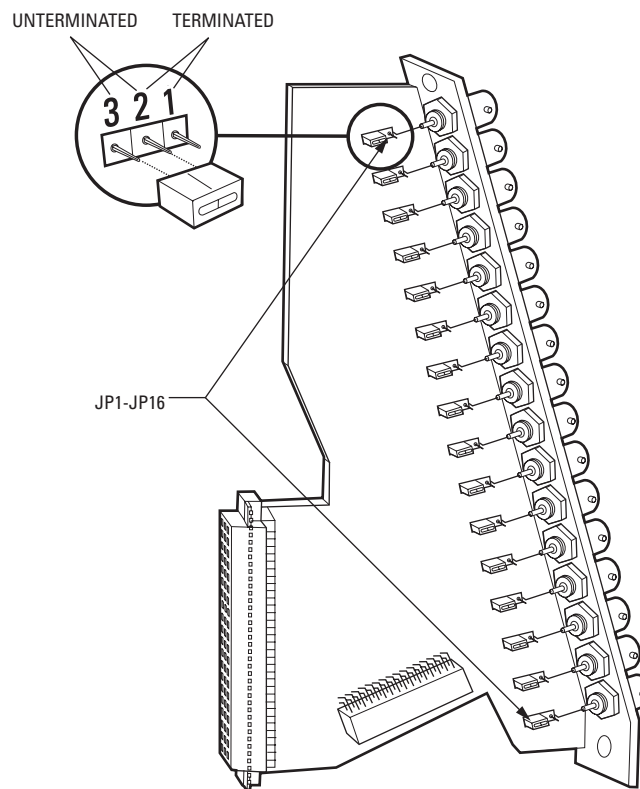
#### WARNINGS:

- Rear panel card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** A CM9760-RPM card must be installed *before* the associated CM9760-VMC video input card is installed.

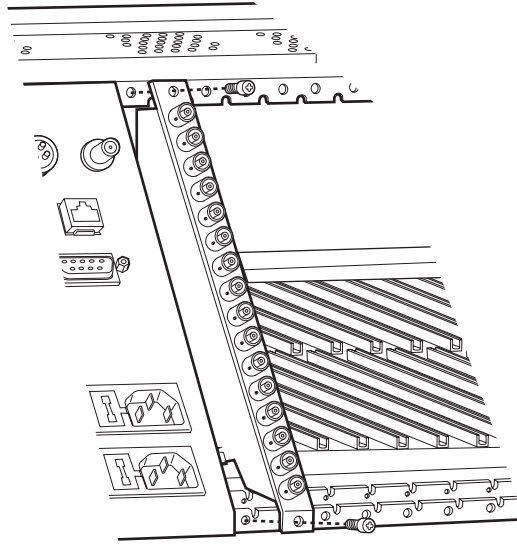
To install a CM9760-RPM card, do the following:

1. Ensure that termination jumpers JP1-JP16 are set in the unterminated position (positions 2 and 3) (refer to Figure 26).



**Figure 26.** Termination Jumpers on CM9760-RPM Card

2. Locate the desired slot position at the rear of the bay.
3. Remove the blank cover plate by loosening the screw at the top and bottom of the plate.
4. Slide the new card into the card guides of the leftmost slot (refer to Figure 27).



**Figure 27.** CM9760-RPM Rear Panel Output Card Installation

5. Push the card into place firmly.
6. Tighten the screw at the top and bottom of the card.
7. Connect BNC cables (or ribbon cable, if applicable).

## Replacing a CM9760-RPM Card



### WARNINGS:

- Rear panel card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a rear panel card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

**NOTE:** Before replacing a CM9760-RPM card, you must remove the front panel of the matrix bay and disconnect the associated CM9760-VMC video output card from the connectors on the backplane and from the connector on the CM9760-RPM card that is to be replaced. To disconnect the CM9760-VMC card, grasp the two card handles and firmly pull the card toward you until the card is disconnected.

Unless the audible alarm on the power supply has been disabled, the alarm beeps and the Frame Fault LED flashes red when the CM9760-VMC card is disconnected (refer to the *Installing or Replacing a CM9760-VMC Video Output Card* section for additional information).

To replace a CM9760-RPM card, do the following:

1. Ensure that the associated CM9760-VMC video output card is disconnected as noted above.
2. Disconnect BNC cables (or ribbon cable, if applicable) from the CM9760-RPM card being replaced.
3. Remove the CM9760-RPM card by loosening the screw at the top and bottom of the card and then pulling the card toward you until it is out of the frame.
4. Install the new card (refer to the *Installing a CM9760-RPM Card* section).

After the CM9760-RPM card has been replaced, reconnect the associated CM9760-VMC card by sliding the card toward the rear of the matrix bay until the card is seated firmly with the backplane connectors and CM9760-RPM connector. If the audible alarm on the power supply is enabled, the alarm stops beeping and the Frame Fault LED turns off.

To ensure proper operation of the CM9760-VMC card, reset the card by pressing the Reset button on the card. For about five seconds, the audible alarm on the power supply beeps and the Frame Fault LED flashes red. Then reattach the front panel of the matrix bay.

## INSTALLING OR REPLACING A CM9760-VCC VIDEO INPUT CARD

CM9760-VCC video input cards are installed into the front of the matrix bay behind the front panel. For an initial system installation, the cards are installed at the factory as ordered. CM9760-VCC cards (and associated rear panel cards) can be added to expand a system or can be replaced if necessary. To install or replace a CM9760-VCC card, refer to the sections that follow.

### INSTALLING A CM9760-VCC CARD

#### WARNINGS:

- CM9760-VCC video input card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a CM9760-VCC card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

Before installing a CM9760-VCC card, note the following:

- A CM9760-VCC card can be installed while the matrix bay is powered on.
- A CM9760-VCC card can be installed into any available slot ranging from slot 1 to slot 16, totaling a maximum of 16 CM9760-VCC cards. A CM9760-VCC card cannot be installed into slot 17—slot 17 is reserved for the CM9760-VMC video output card.
- Each slot position (slots 1-16) into which a CM9760-VCC card can be installed corresponds to a specific range of physical inputs; for example, slot position 1 corresponds to physical inputs 1-16, slot position 2 corresponds to physical inputs 17-32, and so on. Physical input numbers are used when programming the CM9760-MXB using the CM9700-MGR; therefore, if you do not install CM9760-VCC cards in sequential order, be sure to use the correct physical input numbers when programming the CM9760-MXB.

Table F lists the 16 slot positions and their corresponding physical input range.

**Table F.** CM9760-VCC Slot Positions and Corresponding Physical Input Range

Slot Position	Physical Input Range	Slot Position	Physical Input Range
1	1-16	9	129-144
2	17-32	10	145-160
3	33-48	11	161-176
4	49-64	12	177-192
5	65-80	13	193-208
6	81-96	14	209-224
7	97-112	15	225-240
8	113-128	16	241-256

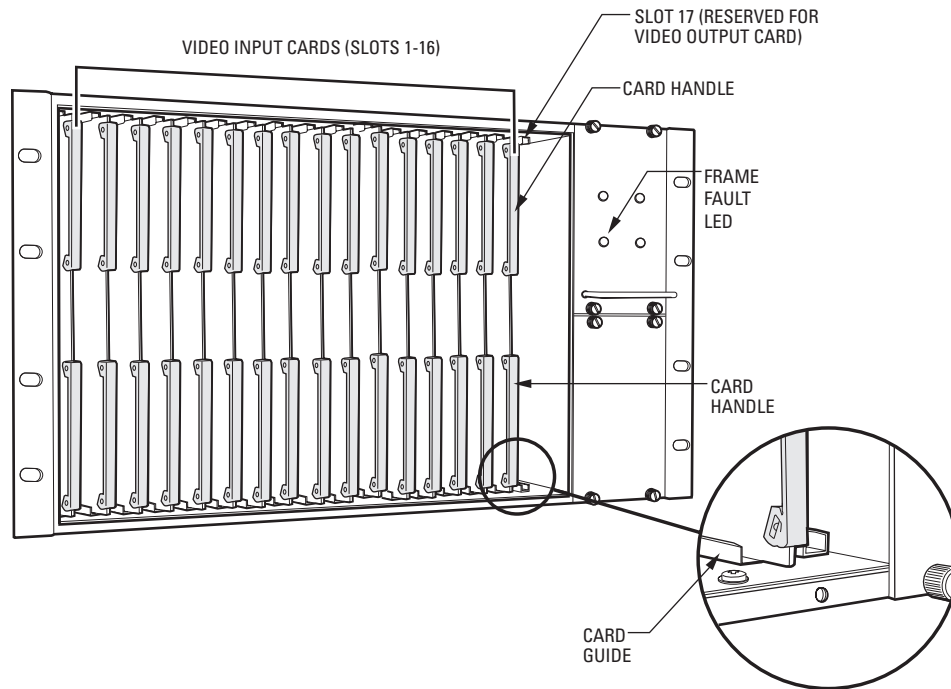
- The CM9760-VCC card requires a rear panel input card: CM9760-RPC, CM9760-RPL, CM9760-DFC, or CM9760-DFL. The associated rear panel input card should be installed into the correct slot in the rear of the matrix bay before a CM9760-VCC card is installed. For instructions to install rear panels cards, refer to the *Installing or Replacing Rear Panel Cards* section.

To install a CM9760-VCC card, do the following:

1. Remove the front panel of the matrix bay.
2. Insert the CM9760-VCC card into the desired slot (slots 1-16) as follows (refer to Figure 28):
  - a. Align the top and bottom edges of the card with the top and bottom card guides of the matrix bay.
  - b. Slide the card toward the rear of the matrix bay until the card is seated firmly with the connectors on the backplane and with the associated rear panel card connector. Note that, unless the audible alarm on the power supply has been disabled, the alarm beeps twice and the Frame Fault LED flashes red twice.

The LEDs on the CM9760-VCC card indicate proper operation.

3. Reattach the front panel of the matrix bay.



**Figure 28.** CM9760-VCC Video Input Card Installation (Slots 1-16)

## REPLACING A CM9760-VCC CARD



### **WARNINGS:**

- CM9760-VCC video input card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a CM9760-VCC card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

To replace a CM9760-VCC card, do the following:

1. Remove the front panel of the matrix bay.
2. Remove the CM9760-VCC card to be replaced by grasping the two card handles and firmly pulling the card out of the connectors on the backplane and associated rear panel card. The card slides out of the slot.
3. Install the new card into the slot of the card being replaced (refer to the *Installing a CM9760-VCC Card* section for installation instructions).



## INSTALLING OR REPLACING A CM9760-VMC VIDEO OUTPUT CARD

One CM9760-VMC4, CM9760-VMC8, CM9760-VMC12, or CM9760-VMC16 video output card can be installed in the CM9760-MXB. For an initial system installation, the CM9760-VMC card is installed at the factory as ordered. If additional matrix bays are ordered to expand an existing system, the CM9760-VMC card may need to be installed. If necessary, a CM9760-VMC card can be replaced. To install or replace a CM9760-VMC card, refer to the sections that follow.

### INSTALLING A CM9760-VMC CARD



#### WARNINGS:

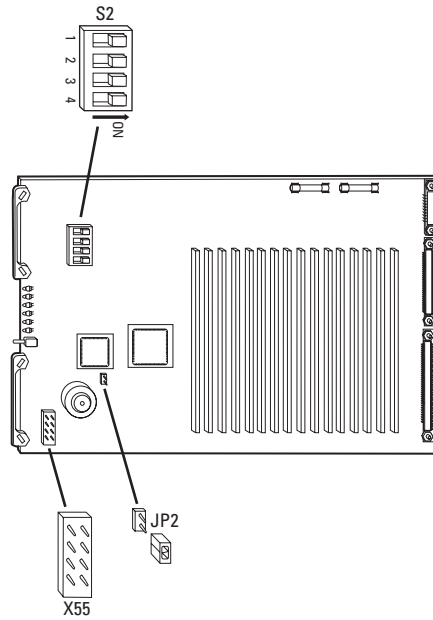
- CM9760-VMC video output card installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when installing a CM9760-VMC card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

Before installing a CM9760-VMC card, note the following:

- The CM9760-VMC card can be installed while the matrix bay is powered on.
- The CM9760-VMC card must always be installed into slot 17 in the front of the matrix bay.
- The CM9760-VMC card requires the CM9760-RPM rear panel video output card. The CM9760-RPM card should be installed in the correct slot in the rear of the matrix bay *before* the CM9760-VMC card is installed. For instructions to install a CM9760-RPM card, refer to the *Installing a CM9760-RPM Card* section.
- When installed in the matrix bay at the factory according to your system order, the S2 DIP switch and X55 and JP2 jumper settings on the CM9760-VMC card are set in the proper position. You must, however, set DIP switch and jumper settings on a new card as instructed in the procedure below.

To install a CM9760-VMC card, do the following:

1. Remove the front panel of the matrix bay.
2. Remove the blank cover plate of slot 17 by loosening the screw at the top and bottom of the plate.
3. Set the S2 DIP switch and the X55 and JP2 jumpers on the new card to be installed:
  - a. Refer to Figure 29 for DIP switch and jumper locations on the CM9760-VMC card.
  - b. Refer to Table G for S2 DIP switch functions and associated settings.
  - c. Refer to Table H for X55 video standards and associated jumper positions.
  - d. Ensure that the JP2 jumper is installed in the two-pin header. The JP2 jumper must always be installed for proper operation.



**Figure 29.** DIP Switch and Jumper Locations on CM9760-VMC Video Output Card

**Table G. S2 DIP Switch Functions and Settings**

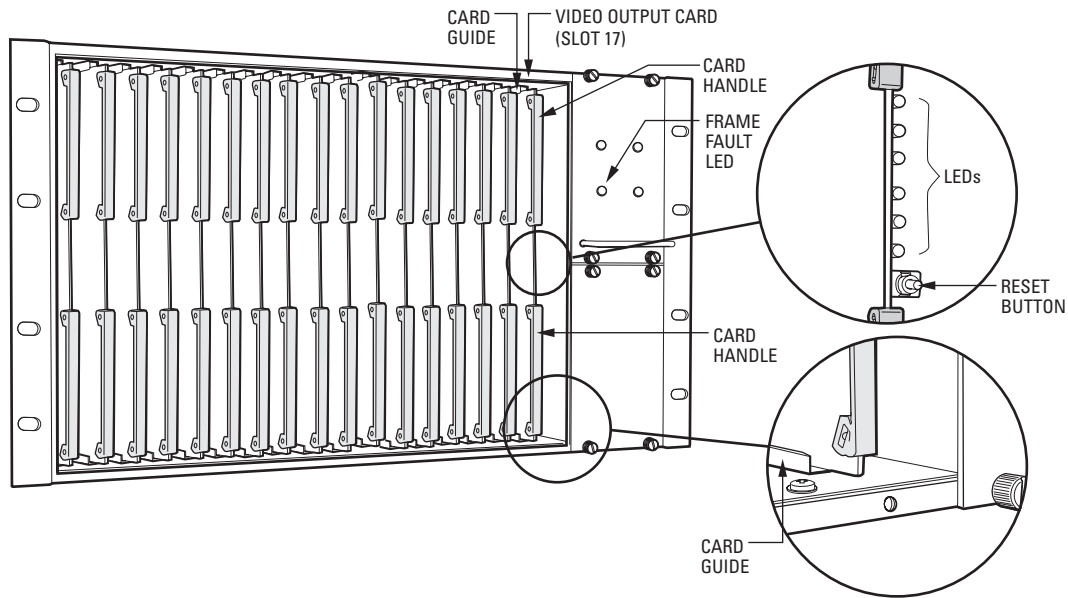
Function	Options	Switch	Setting
Baud Rate	2400	1	Off
		2	Off
	4800	1	Off
		2	On
	9600	1	On
		2	Off
	19200	1	On
		2	On
Video Standard	NTSC*	3	Off
	PAL*	3	On
Video Loss Detection	Enabled	4	On
	Disabled (default)	4	Off
*X55 jumper must also be set (refer to Table H).			

**Table H. X55 Video Standards and Associated Jumper Positions**

Video Standard	Oscillator Frequency	Jumper Positions			
		Pins 1 to 2	Pins 3 to 4	Pins 5 to 6	Pins 7 to 8
SECAM1	5.0 MHz	On	On	On	On
SECAM2	5.0 MHz	On	On	Off	On
624	5.0 MHz	On	Off	On	On
PAL/CCIR	5.0 MHz	On	Off	Off	On
NTSC1	5.034964 MHz	On	On	On	Off
NTSC2	5.034964 MHz	On	On	Off	Off
524	5.034964 MHz	On	Off	On	Off
PAL-M	5.034964 MHz	On	Off	Off	Off

4. Install the new card into slot 17 of the matrix bay as follows (refer to Figure 30):
  - a. Align the top and bottom edges of the card with the top and bottom card guides of the matrix bay.
  - b. Slide the card toward the rear of the matrix bay until the card is seated firmly with the connectors on the backplane and with the associated rear panel card connector. If the audible alarm on the power supply is enabled, the alarm stops beeping and the Frame Fault LED turns off.
  - c. To ensure proper operation of the CM9760-VMC card, reset the card by pressing the Reset button on the card.

For about five seconds, the audible alarm on the power supply beeps and the Frame Fault LED flashes red. The LEDs on the video output card then indicate proper operation.
5. Reattach the front panel of the matrix bay.



**Figure 30.** CM9760-VMC Video Output Card Installation (Slot 17)

## REPLACING A CM9760-VMC CARD

### ⚠ WARNINGS:

- CM9760-VMC video output card replacement should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed when replacing a CM9760-VMC card. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.

Before replacing a CM9760-VMC card, note the following:

- The CM9760-RPM card can be replaced while the matrix bay is powered on.
- When installed in the matrix bay at the factory according to your system order, the S2 DIP switch and X55 and JP2 jumper settings on the CM9760-RPM card are set in the proper position. You must, however, set DIP switch and jumper settings on a new card as instructed in the procedure below.

To replace the CM9760-VMC card, do the following:

1. Remove the front panel of the matrix bay.
2. Remove the CM9760-VMC card to be replaced by grasping the two card handles and firmly pulling the card out of the connectors on the backplane and associated rear panel card. The card slides out of the slot.

**NOTE:** Unless the audible alarm on the power supply has been disabled, the alarm beeps and the Frame Fault LED flashes red when the CM9760-VMC card is removed.

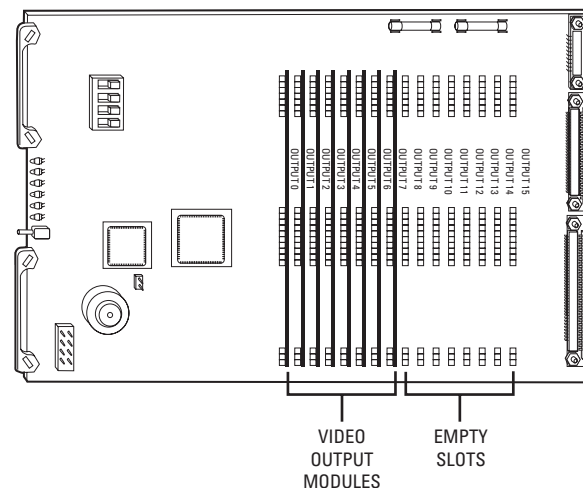
3. Install the new CM9760-VMC card (refer to the *Installing a CM9760-VMC Card* section). Note that you should set the S2 DIP switch and the X55 and JP2 jumpers on the new card to match the settings on the card being replaced.

## INSTALLING A CM9760-VMM VIDEO OUTPUT MODULE

### ⚠ WARNINGS:

- CM9760-VMM video output module installation should be performed by qualified personnel only.
- Electrostatic discharge (ESD) precautions must be observed. Always wear a grounding strap connected to an approved grounding source when working on or near exposed electronic equipment.
- When installing a CM9760-VMM module, exercise caution to prevent bending any of the pins on the module.

To install a CM9760-VMM module into an empty slot on a CM9760-VMC4, CM9760-VMC8, or CM9760-VMC12 card, align the pins on the module with the three sockets on the card (refer to Figure 31) and push the card down carefully until the pins are firmly seated into the sockets.



**Figure 31.** CM9760-VMM Video Output Module Locations (CM9760-VMC8 Video Output Card)

**NOTE:** CM9760-VMM slot locations on the CM9760-VMC card are numbered OUTPUT 0 to OUTPUT 15—not OUTPUT 1 to OUTPUT 16.

## INSTALLING OR REPLACING A POWER SUPPLY

Unless a backup power supply is ordered with the matrix bay, the unit is shipped from the factory with one power supply installed. A backup power supply can be added to the matrix bay to provide power redundancy to the unit. If necessary, a power supply can be replaced.

Note the following:

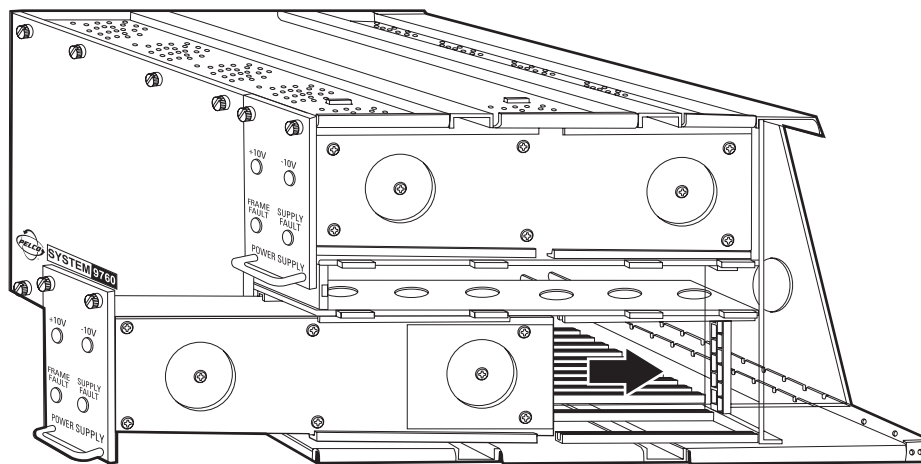
- The CM9760-MXB uses the CM9760-MPS power supply (120 VAC, 60 Hz).
- The CM9760-MXB-X uses the CM9760-MPS-X power supply (230 VAC, 50 Hz).
- A power supply provides an audible alarm that operates in conjunction with the Fault LEDs located on the front of the power supply. By default, the alarm is enabled. You can disable the alarm if desired. For additional information, refer to the *Enabling/Disabling the Power Supply Alarm* section.

## INSTALLING A BACKUP POWER SUPPLY

**NOTE:** You can install a backup power supply while the matrix bay is powered on. You do not need to turn off power to the unit.

To install a backup power supply, do the following:

1. Remove the blank plate from the unoccupied power supply slot.
2. Align the power supply in the mounting rails and then slide the power supply into the slot (refer to Figure 32).
3. Press firmly on the front of the power supply until it is firmly seated into the rear connector.
4. Tighten the two captive panel screws at the top and bottom of the power supply.
5. Plug the power cord into the power input receptacle of the power supply.
6. Plug the other end of the power cord into the power source.
7. Place the power switch of the power supply in the On (I) position.



**Figure 32.** CM9760-MXB Backup Power Supply Installation

## REPLACING A POWER SUPPLY

To replace a power supply, do the following:

1. Remove the power supply to be replaced as follows:
  - a. Place the power switch in the Off (0) position.
  - b. Disconnect the power cord from the power source.
  - c. Remove the power supply from the power supply slot as follows:
    - (1) Loosen the two captive panel screws at the top and bottom of the power supply.
    - (2) Pull the power supply toward you. The power supply slides out of the slot.
2. Install the new power supply as follows:
  - a. Align the power supply in the mounting rails and then slide the power supply into the slot.
  - b. Press firmly on the front of the power supply until it is firmly seated into the rear connector.
  - c. Tighten the two captive panel screws at the top and bottom of the power supply.
  - d. Plug the power cord into the power source.
  - e. Place the power switch of the power supply in the On (I) position.

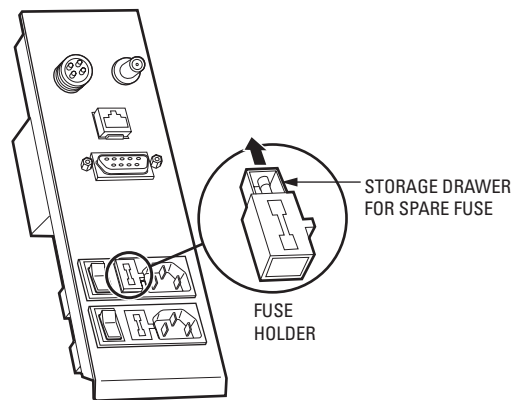
## REPLACING A POWER SUPPLY FUSE

The rear of the matrix bay provides a separate power input receptacle for each power supply. Each power input receptacle is equipped with a fuse holder (refer to Figure 33). Each fuse holder provides a spare fuse to be used when replacing a blown fuse.

**⚠ WARNING:** Failure to replace a fuse with a fuse of the same rating can result in serious damage to the matrix bay.

To replace the fuse in a power supply, do the following:

1. Remove the power cord from the power input receptacle.
2. Using a small screwdriver, pry the fuse holder out of the socket. The fuse holder comes out of the unit.
3. Replace the fuse with a fuse of the same rating. If using the spare fuse, be sure to replace it with a fuse of the same rating.
4. Install the fuse holder back into the socket.
5. Plug the power cord into the power input receptacle.



**Figure 33.** CM9760-MXB Power Supply Fuse Replacement

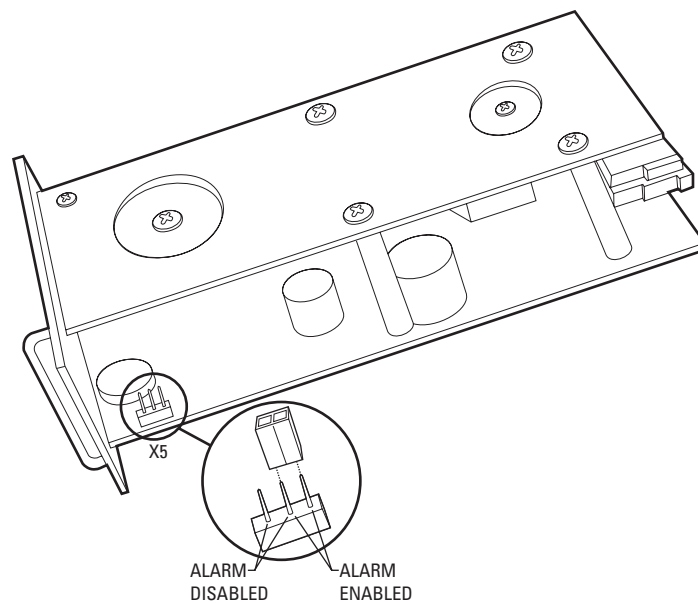


## ENABLING/DISABLING THE POWER SUPPLY ALARM

The power supply provides an audible alarm that operates in conjunction with the Fault LEDs located on the front of the power supply. By default, the alarm is enabled. The X5 jumper on the power supply allows you to enable/disable the alarm (refer to Figure 34).

To enable/disable the audible power supply alarm, do the following:

1. Place the power switch of the power supply in the Off (0) position.
2. Disconnect the power cord from the power source.
3. Remove the power supply from the power supply slot as follows:
  - a. Loosen the two captive panel screws at the top and bottom of the power supply.
  - b. Pull the power supply toward you. The power supply slides out of the slot.
4. Locate the X5 jumper on the power supply (refer to Figure 34).
5. Position the jumper to enable/disable the alarm as shown in Figure 34.



**Figure 34. CM9760-MXB Power Supply Alarm Jumper Positions**

6. Install the power supply back into the power supply slot as follows:
  - a. Align the power supply in the mounting rails and then slide the power supply into the slot.
  - b. Press firmly on the front of the power supply until it is firmly seated into the rear connector.
  - c. Tighten the two captive panel screws at the top and bottom of the power supply.
7. Plug the power cord into the power source.
8. Place the power switch of the power supply in the On (I) position.

# System Programming Using DOS

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The CM9700-CC1 runs under Microsoft® DOS (Disk Operating System) 6.22, referred to as MS-DOS® 6.22 and also commonly referred to simply as DOS. This section provides information about the following:

- System 9760 programming tasks that are performed using DOS operations
- DOS filename conventions
- DOS commands that are commonly used when managing 9760 system files

## NOTES:

- For an overview of the DOS directory structure of the CM9700-CC1, refer to *Directory Structure* in the *CM9700-CC1 Controller* section.
- For detailed information about programming the 9760 system using the CM9700-MGR, refer to the CM9700-MGR Software Guide.

## PERFORMING SYSTEM 9760 DOS PROGRAMMING TASKS

Using DOS operations, you can perform the following tasks:

- Copy configuration files from the CM9700-MGR to the CM9700-CC1
- Set and adjust system time in a single-node system
- Set and adjust system time in a multi-node system

To perform each of the above tasks, refer to the sections that follow.

### COPYING CONFIGURATION FILES FROM THE CM9700-MGR TO THE CM9700-CC1

**NOTE:** Before copying configuration files from the CM9700-MGR to the CM9700-CC1, it is recommended that you save a copy of the existing CM9700-CC1 configuration files.

To copy configuration files from the CM9700-MGR to the CM9700-CC1, do the following:

1. Export configuration files from the CM9700-MGR to a floppy disk using the Export to Configuration Files option of the CM9700-MGR. For detailed instructions, refer to the CM9700-MGR Software Guide.
2. Insert the floppy disk into the disk drive of the CM9700-CC1.
3. Using the keyboard connected to the AT-compatible keyboard port of the CM9700-CC1, press Ctrl+Q to exit the 9760 system.

The VGA monitor displays the C:\9700> prompt.

4. At the prompt, copy all configuration files from the floppy disk to the CM9700-CC1 by entering the following:

**copy a:filename.\***

where *filename* is the root name of the configuration files. For example, if the root name is NODE1, enter the following:

**copy a:node1.\***

5. Press Enter.

Either of the following occurs:

- The configuration files are copied to the CM9700-CC1. Skip step 6 and proceed to step 7.
- If the previous configuration files exist in the C:\9700 directory, the following message appears:

Files Already Exist, Over Write? Y/N/A

Continue with step 6.

6. Enter **A** to overwrite all existing files on the CM9700-CC1 with the files contained on the floppy disk.

**NOTE:** Entering **Y** for Yes requires that you confirm on a file-by-file basis that you wish to overwrite the existing file. Entering **N** for No requires that you confirm on a file-by-file basis that you do not wish to overwrite the existing file.

7. Remove the floppy disk from the disk drive of the CM9700-CC1.
8. Press Ctrl+Alt+Delete to reboot the CM9700-CC1. Note that you must press the Del key on the numeric keypad of your keyboard in order to reboot the system.

## SETTING AND ADJUSTING SYSTEM TIME IN A SINGLE-NODE SYSTEM

You can set system time in a single-node system using the PC keyboard that is connected to the AT-compatible keyboard port of the CM9700-CC1. Using the CM9700-CC1 PC keyboard, you can also adjust system time if the system clock is running fast (system lead time) or slow (system lag time). For detailed instructions to set and adjust system time, refer to the sections that follow.

**NOTE:** System time can also be set using the CM9760-KBD rather than the CM9700-CC1 PC keyboard; however, to adjust system time, the CM9700-CC1 PC keyboard must be used.

### Setting System Time in a Single-Node System

Before setting system time, note the following:

- Begin the process of setting system time close to the top of the hour.
- When setting system time, you must synchronize the system clock to a reference time clock (RTC).
- In a configuration having a CM9760-HS hot switch, setting and adjusting time on one CM9700-CC1 synchronizes the time between both CM9700-CC1s. (For detailed information about the CM9760-HS hot switch, refer to the CM9760-HS Hot Switch Installation/Operation manual.)

To set the system time using the CM9700-CC1 PC keyboard, do the following:

1. From the CM9700-CC1 diagnostic screen, press Alt+N to display the current configuration filename.

The configuration filename is displayed in the System box. You will need to enter the name later in this procedure when directed.

2. Press Ctrl+Q to exit the 9760 system.

The C:\9700> prompt appears.

3. At the prompt, enter **time** and then press Enter.

The currently set time is displayed and the following prompt appears:

Enter new time:

4. Do the following:

- a. Enter a time equaling the top of the hour in the xx:xx:xx.xx format followed by the letter *a* for AM or *p* for PM (for example, 2:00:00.00p for 2:00 PM). Do *not* press Enter.
- b. Wait for the RTC to approach the top of the hour.
- c. When the RTC equals the top of the hour, press Enter.

5. At the C:\9700> prompt, invoke the system executable by entering **startup** and then pressing Enter.

After the CM9700-CC1 initializes, the CM9700-CC1 diagnostic screen appears. In addition, the system time entered in step 4 is displayed on all monitors in the system.

After the system has run 24 hours or a multiple of 24 hours, you can adjust system time if the system clock is running fast or slow when compared to the RTC. To adjust system time, refer to the *Adjusting System Time in a Single-Node System* section.

## Adjusting System Time in a Single-Node System

To adjust system time in a single-node system, do the following:

1. Wait 24 hours—or a multiple of 24 hours if necessary—since the system time was set, and then compare the system time displayed on any monitor in the system with the RTC time. Note the difference in time for a 24-hour period and whether the system time is ahead of or behind RTC time. For example, if system time is 2:02:30 PM and RTC time is 2 PM after a 24-hour period, then system time is ahead of RTC time by 2 minutes and 30 seconds.

If the amount of time over which you are comparing system time to RTC time is a multiple of 24 hours, perform steps a-c that follow to determine the difference in time per 24-hour period; otherwise, proceed to step 2.

- a. Convert the time difference noted between system time and RTC time to seconds.
  - b. Divide the total number of seconds by the elapsed time in hours to determine the seconds per hour rate of change. For example, if a 90-second time difference had occurred over a time interval of 3 days or 72 hours, then the rate of change in seconds per hour is 1.25 (90 divided by 72 = 1.25).
  - c. Multiply the seconds per hour rate of change by 24 to obtain the time difference in seconds for a 24-hour period. For example, multiplying 1.25 by 24 equals a time difference of 30 seconds per 24-hour period.
2. Using the CM9760-KBD, set system time at the top of the hour in 24-hour format. For example, if RTC time equals 2:00 PM, enter the following:

**14 00 00**

3. At the CM9700-CC1 diagnostic screen, press Alt+L using the CM9700-CC1 PC keyboard.

The System box displays the following:

System :-Last Adj 0:0.0 Total 0:0.0

4. Enter the time difference noted in step 1 in the following format:

–mm.ss.hh or mm:ss.hh

where:

- – = minus sign. A minus sign must be entered if system time is ahead of RTC time and must be slowed for synchronization with RTC time.
- mm = minutes
- ss = seconds
- hh = hundredths of a second

For example, to enter the time difference of 2 minutes and 30 seconds noted in step 1 in order to slow system time over the next 24 hours, enter the following:

**–02:30.00**

5. Press Enter.
6. Press Alt+L to display the adjustment you have made to system time.

The adjustment is displayed in the System box on the diagnostic screen. For example, for the time difference of 2 minutes and 30 seconds that was entered in step 4 above, the System box displays the following:

Last Adj. –2:30.0 Total –2:30.0

where:

Last Adj. displays the last time adjustment that was made in minutes, seconds, and hundredths of a second. In the example, the last adjustment that was made is –2:30.0.

Total displays the total time adjustment that was made in minutes, seconds, and hundredths of a second. In the example, the total adjustment that was made is –2:30.0.

After the system has run 24 hours or a multiple of 24 hours after the time adjustment was made, you can adjust the system time again if necessary. To make additional adjustments to system time, refer to the *Making Additional Adjustments to System Time* section.

**NOTE:** The time adjustment that was made to system time as displayed in step 6 above is a temporary time adjustment. If you reboot the CM9700-CC1 by pressing Ctrl+Alt+Del or exit the 9760 system by pressing Ctrl+Q, the time adjustment reverts to 0:0.0. As a result, you must edit the startup.bat file to permanently program the total time adjustment indicated in the System box after the final time adjustment is made. Instructions for editing the startup.bat file are provided in the *Editing the Startup.bat File to Permanently Adjust System Time* section.

## Making Additional Adjustments to System Time

To make an additional adjustment to system time, do the following:

1. Wait 24 hours—or a multiple of 24 hours if necessary—since the last time adjustment was made, and then compare the system time displayed on any monitor in the system with the RTC time. Note the difference in time for a 24-hour period and whether the system time is ahead of or behind RTC time.
2. Using the CM9760-KBD, set system time at the top of the hour in 24-hour format when the RTC reaches the top of the hour.
3. At the CM9700-CC1 diagnostic screen, press Alt+L.

The System box displays the latest time adjustment values. For example, if a time adjustment of -2:30.00 was entered to slow system time 2 minutes and 30 seconds, the System box displays the following:

Last Adj. -2:30.0 Total -2.30.0

4. Enter a new time adjustment based on adding or subtracting time from the last time adjustment that was made. For example, when comparing system time with RTC time after five 24-hour periods have passed since the last time adjustment was made and determining that system time is running 10 seconds slow—an average of 2 seconds slower for each 24 hours of elapsed time—you can change the last time adjustment by adding 2 seconds. If the last time adjustment was -02:30.00, the following time adjustment must be entered as follows to add 2 seconds:

**-02:28.0**

Note that -02.28.0 is derived from the following equation:  $[(-02:30.0) + (00:02.0)] = -02.28.0$

5. Press Enter.

The System box displays the last time adjustment and total time adjustment values. In the example, the System box displays the following:

Last Adj. -2:28.0 Total -4.58.0

Note that the total time adjustment is -4.58.0.

6. If necessary, continue to make additional time adjustments until the system clock and RTC are synchronized.

**NOTE:** The time adjustments that are made to system time are temporary time adjustments. If you reboot the CM9700-CC1 by pressing Ctrl+Alt+Del or exit the 9760 system by pressing Ctrl+Q, the time adjustment values revert to 0:0.0. As a result, you must edit the startup.bat file to permanently program the total time adjustment indicated in the System box after the final time adjustment is made. Instructions for editing the startup.bat file are provided in the *Editing the Startup.bat File to Permanently Adjust System Time* section.

## Editing the Startup.bat File to Permanently Adjust System Time

To permanently adjust system time, you must edit the startup.bat file to include the total time adjustment indicated in the System box after the final adjustment is made to system time. To edit the startup.bat file to include the total time adjustment, do the following:

1. Press Ctrl+Q to exit the 9760 system.

The C:\9700> prompt appears.

2. At the prompt, enter **edit startup.bat** and then press Enter.

The startup.bat file opens and appears as follows:

CM9700 NODE $x$

where:

$x$  is the node number:

- NODE1 is the default configuration filename for a single-node system.
- Default configuration filenames for each node within a multi-node system are numbered sequentially according to the CM9700-NW1 port number to which each CM9700-CC1 is connected, for example, NODE5 and NODE6 in a two-node system.

3. Edit the startup.bat file to include the total time adjustment as follows:

CM9700 NODE $x$  /T:–mm:ss:hh

or

CM9700 NODE $x$  /T:mm:ss:hh

where:

- /T = time adjustment switch command
- – = minus sign. A minus sign must be entered if system time is ahead of RTC time and must be slowed for synchronization with RTC time.
- mm = minutes
- ss = seconds
- hh = hundredths of a second

For example, to enter the total time adjustment of 4 minutes and 58 seconds to slow the system clock in a 24-hour period, edit the startup.bat file as follows:

CM9700 NODE $x$  /T:-04:58:00

4. Press Alt+F and then type the letter **s** to save the file.
5. Press Alt+F and then type the letter **x** to exit the file.
6. At the C:\9700 prompt, enter **startup** and then press Enter to restart the system.

The time adjustment is now permanent. If you reboot the CM9700-CC1 by pressing Ctrl+Alt+Del or exit the 9760 system by pressing Ctrl+Q, the time adjustment remains in system memory and does not revert to 0:0:0.

## SETTING AND ADJUSTING SYSTEM TIME IN A MULTI-NODE SYSTEM

You can set system time in a multi-node system using the PC keyboard that is connected to the AT-compatible keyboard port of the CM9700-NW1. The CM9700-NW1 then provides system timing to the network. Using the CM9700-NW1 PC keyboard, you can also adjust system time if the system clock is running fast (system lead time) or slow (system lag time). For detailed instructions to set and adjust system time, refer to the sections that follow.

**NOTE:** System time can also be set using the CM9760-KBD rather than the CM9700-NW1 PC keyboard; however, to adjust system time, the CM9700-NW1 PC keyboard must be used.

### Setting System Time in a Multi-Node System

Before setting system time, note the following:

- Begin the process of setting system time close to the top of the hour.
- When setting system time, you must synchronize the system clock to a reference time clock (RTC).
- If the CM9700-NW1 goes offline, each node reverts to its own internal system time.

To set system time using the CM9700-NW1 PC keyboard, do the following:

1. Press Ctrl+Q to exit the CM9700-NW1 diagnostic screen.

The screen provides a display similar to the following:

```
Program end. Vectors reset.
```

```
11:36:49.12 Mon 06-22-2005 C:\NETWORK>_
```

2. At the prompt, enter **time** and then press Enter.

The currently set time is displayed and the following prompt appears:

Enter new time:

3. Do the following:
  - a. Enter a time equaling the top of the hour in the xx:xx:xx.xx format followed by the letter *a* for AM or *p* for PM (for example, 2:00:00.00p for 2:00 PM). Do *not* press Enter.
  - b. Wait for the RTC to approach the top of the hour.
  - c. When the RTC equals the top of the hour, press Enter.
4. At the C:\NETWORK> prompt, invoke the system executable by entering **net** and then press Enter.

The system time entered in step 3 is displayed on all monitors in the system.

After the system has run 24 hours or a multiple of 24 hours, you can adjust system time if the system clock is running fast or slow when compared to the RTC. To adjust system time, refer to the *Adjusting System Time in a Multi-Node System* section.

## Adjusting System Time in a Multi-Node System

To adjust system time in a multi-node system, do the following:

1. Wait 24 hours—or a multiple of 24 hours if necessary—since the system time was set, and then compare the system time displayed on any monitor in the system with the RTC time. Note the difference in time for a 24-hour period and whether the system time is ahead of or behind RTC time. For example, if system time is 2:02.30 PM and RTC time is 2 PM after a 24-hour period, then system time is ahead of RTC time by 2 minutes and 30 seconds.

If the amount of time over which you are comparing system time to RTC time is a multiple of 24 hours, perform steps a-c that follow to determine the difference in time per 24-hour period; otherwise, proceed to step 2.

- a. Convert the time difference noted between system time and RTC time to seconds.
  - b. Divide the total number of seconds by the elapsed time in hours to determine the seconds per hour rate of change. For example, if a 90-second time difference had occurred over a time interval of 3 days or 72 hours, then the rate of change in seconds per hour is 1.25 (90 divided by 72 = 1.25).
  - c. Multiply the seconds per hour rate of change by 24 to obtain the time difference in seconds for a 24-hour period. For example, multiplying 1.25 by 24 equals a time difference of 30 seconds per 24-hour period.
2. Using the CM9760-KBD, set system time at the top of the hour in 24-hour format. For example, if RTC time equals 2:00 PM, enter the following:

**14 00 00**

3. At the CM9700-NW1 diagnostic screen, press Alt+L using the CM9700-NW1 PC keyboard.

The screen provides a display similar to the following:

```
*****TIME ADJUSTMENT*****
Last Time Adjustment  0:0.0
Total Time Adjustment 0:0.0
Format Example
+10:20.5 Adds      10 min 20.5 seconds per day
-5:10.61 Subtracts 5 min 10.61 seconds per day
*****ESC TO CANCEL*****
=>
```

4. At the => system prompt, enter the time difference noted in step 1 in the following format:

-mm.ss.hh or mm:ss.hh

where:

- - = minus sign. A minus sign must be entered if system time is ahead of RTC time and must be slowed for synchronization with RTC time.
- mm = minutes
- ss = seconds
- hh = hundredths of a second

For example, to enter the time difference of 2 minutes and 30 seconds noted in step 1 in order to slow system time over the next 24 hours, enter the following:

**-02:30.00**



5. Press Enter.

The adjustment is displayed. For example, for the adjustment of -02:30.00 that was made in step 4, the following line appears:

Last Adj. -2:30.0 Total -2:30.0

where:

Last Adj. displays the last time adjustment that was made in minutes, seconds, and hundredths of a second. In the example, the last adjustment that was made is -2:30:0.

Total displays the total time adjustment that was made in minutes, seconds, and hundredths of a second. In the example, the total adjustment that was made is -2:30.0.

6. If desired, press Alt+N to check the system time.

The line containing the system time appears similar to the following:

Fri June 24 15:40:23 2005 CM9700 NIU Ver xxx xxx Setup file:2nodes.niu

After the system has run 24 hours or a multiple of 24 hours since a time adjustment was made, you can adjust the system time again if necessary. To make additional adjustments to system time, refer to the *Making Additional Adjustments to System Time* section.

**NOTE:** The time adjustment that was made to system time as displayed in step 5 above is a temporary time adjustment. If you reboot the CM9700-NW1 by pressing Ctrl+Alt+Del or stop operation of the CM9700-NW1 by pressing Ctrl+Q, the time adjustment reverts to 0:0:0. As a result, you must edit the net.bat file to permanently program the total time adjustment indicated on the diagnostic screen after the final time adjustment is made. Instructions for editing the net.bat file are provided in the *Editing the Net.bat File to Permanently Adjust System Time* section.

## Making Additional Adjustments to System Time

To make an additional adjustment to system time, do the following:

1. Wait 24 hours—or a multiple of 24 hours if necessary—since the last time adjustment was made, and then compare the system time displayed on any monitor in the system with the RTC time. Note the difference in time for a 24-hour period and whether the system time is ahead of or behind RTC time.
2. Using the CM9760-KBD, set system time at the top of the hour in 24-hour format when the RTC reaches the top of the hour.
3. At the CM9700-NW1 diagnostic screen, press Alt+L.

The screen displays the latest time adjustment that was made. For example, if a time adjustment of -2:30.0 was entered to slow system time 2 minutes and 30 seconds, the screen displays the following:

```
*****TIME ADJUSTMENT*****  
Last Time Adjustment -2:30.0  
Total Time Adjustment -2:30.0  
Format Example  
+10:20.5 Adds      10 min 20.5 seconds per day  
-5:10.61 Subtracts 5 min 10.61 seconds per day  
*****ESC TO CANCEL*****  
=>
```

4. At the => system prompt, enter a new time adjustment based on adding or subtracting time from the original time adjustment. For example, when comparing system time with RTC time after five 24-hour periods have passed since the original time adjustment was made and determining that system time is running 10 seconds slow—an average of 2 seconds slower for each 24 hours of elapsed time—you can change the original time adjustment by adding 2 seconds. If the original time adjustment was -02:30.00, the following time adjustment must be entered as follows to add 2 seconds:

**-02:28.0**

Note that -02:28.0 is derived from the following equation:  $[(-02:30.0) + (00:02.0)] = -02:28.0$

5. Press Enter.

The adjustment is displayed. For example, for the adjustment of -02:28.0 that was made in step 4, the following line appears:

Last Adj. -2:28.0 Total -4.58.0

Note that the total time adjustment is -4.58.0.

6. If desired, press Alt+N to check the system time.

The line containing the system time appears similar to the following:

Sat June 25 15:40:18 2005 CM9700 NIU Ver xxx xxx Setup file:2nodes.niu

7. If necessary, continue to make additional time adjustments until the system clock and RTC are synchronized.

**NOTE:** The time adjustments that are made to system time are temporary time adjustments. If you reboot the CM9700-NW1 by pressing Ctrl+Alt+Del or stop operation of the CM9700-NW1 by pressing Ctrl+Q, the time adjustment values revert to 0:0.0. As a result, you must edit the net.bat file to permanently program the total time adjustment indicated on the diagnostic screen after the final time adjustment is made. Instructions for editing the net.bat file are provided in the *Editing the Net.bat File to Permanently Adjust System Time* section.

## Editing the Net.bat File to Permanently Adjust System Time

To permanently adjust system time, you must edit the net.bat file to include the total time adjustment indicated on the diagnostic screen after the final adjustment is made to system time. To edit the net.bat file to include the total time adjustment, do the following:

1. Press Ctrl+Q to stop operation of the CM9700-NW1.

The screen displays the following:

Program end. Vectors reset.

11:36:49.12 Mon 06-27-2005 C:\NETWORK>\_

2. At the prompt, enter **edit net.bat** and then press Enter.

The net.bat file opens and appears as follows:

9700NIU xNODES

where *x* equals the number of nodes in the network when the CM9700-NW1 is shipped as part of a system order, for example, 2NODES.NIU for a two-node system, 3NODES.NIU for a three-node system, and so on. The default configuration file name is 2NODES.NIU when the CM9700-NW1 is shipped as a standalone unit.

3. Edit the net.bat file to include the total time adjustment as follows:

9700NIU xNODES /T:-mm:ss:hh

or

9700NIU xNODES /T:mm:ss:hh

where:

- /T = time adjustment switch command
- – = minus sign. A minus sign must be entered if system time is ahead of RTC time and must be slowed for synchronization with RTC time.
- mm = minutes
- ss = seconds
- hh = hundredths of a second

For example, to enter the total time adjustment of 4 minutes and 58 seconds to slow the system clock in a 24-hour period, edit the net.bat file as follows:

9700NIU xNODES /T:-04:58:00

4. Press Alt+F and then type the letter **s** to save the file.
5. Press Alt+F and then type the letter **x** to exit the file.
6. At the C:\NETWORK prompt, enter **net** and then press Enter to restart the system.

The time adjustment is now permanent. If you reboot the CM9700-NW1 by pressing Ctrl+Alt+Del or stop operation of the CM9700-NW1, the time adjustment remains in memory and does not revert to 0:0:0.

# DOS FILENAME CONVENTIONS

The naming convention for a DOS filename is a root name followed by a period followed by an extension:

- The root name is limited to eight characters with no spaces.
- The extension is three characters.

For example, if the filename is NODE1.CAM, the root name is NODE1 and the extension is CAM.

The following characters cannot be used in the root name or extension. The characters are reserved for particular uses as follows:

\ (backslash)	Used for directory navigation
/ (forward slash)	Used as a delimiter in command line options
: (colon)	Used for a command prompt
. (dot)	Used as a separator between root and extension
* (asterisk)	Used as a wildcard character
? (question mark)	Used as a wildcard character
> (greater than symbol)	Used as a command prompt
< (less than symbol)	Used as a command prompt

# DOS COMMAND REFERENCE

Table I provides a listing of DOS commands that are commonly used when managing 9760 system files.

**Table I. DOS Command Reference**

Command†	Switch††	Description	Example(s)§¶	
Directory Management Commands				
CD		Displays the current directory.	C:\>CD	Displays the root directory as the current directory: C:\>
		Changes the current directory.	C:\>CD 9700	Changes from the root directory (C:\) to the 9700 directory: C:\9700>
			C:\>CD 9700\BKUP	Changes from the root directory to the BKUP directory within the 9700 directory: C:\9700\BKUP>
			C:\9700>CD..	Moves up one level in the directory structure. In the example, moves from the 9700 directory to the root directory.
			C:\9700\BKUP>CD\	Changes to the root directory. In the example, changes from the C:\9700\BKUP directory to the root directory.
			C:\>CD A:	Changes from the root directory to the A drive.
DIR		Displays a list of files and subdirectories within the specified directory.	C:\>DIR	Displays a list of files and subdirectories within the root directory (C:\).
	/W	Displays the contents of a directory in wide format. Up to five file-names or directory names are displayed on one line.	C:\>DIR/W	Displays the contents of the root directory in wide format.

**Table I. DOS Command Reference (Continued)**

Command <sup>†</sup>	Switch <sup>††</sup>	Description	Example(s) <sup>§¶</sup>	
Directory Management Commands <i>(Continued)</i>				
DIR <i>(Continued)</i>	/P	Displays the contents of a directory one screen at a time.	C:\>DIR/P	Displays the contents of the root directory one screen at a time.
	/W/P	Combines /W and /P switches to display the contents of a directory in wide format one screen at a time.	C:\>DIR/W/P	Displays the contents of the root directory in wide format one screen at a time.
MD		Creates a directory	C:\9700>MD FACTORY	Creates a directory named FACTORY within the 9700 directory.
RD or RMDIR		Removes the specified directory. The directory to be removed must not contain any files or sub-directories—the directory must be empty except for the single-dot (.) and double-dot (..) entries.	C:\>RD NETWORK or C:\>RMDIR NETWORK	Removes the NETWORK directory if empty.
TREE		Displays the directory structure of the specified directory and those below it.	C:\TREE	Displays the directories in the root directory and any associated subdirectories.
File and Disk Management Commands				
COPY		Copies a single file or a group of files from one location to another location.	C:\>COPY A:\NODE1.MON C:\9700	Copies the NODE1.MON file from the floppy disk in drive A to the C:\9700 directory.
			C:\>COPY A:\NODE1.* C:\9700	Copies all files with the NODE1 root name from the floppy disk in drive A to the C:\9700 directory.
			C:\9700>COPY A:\NODE1.*	Copies all files with the NODE1 root name from the floppy disk in drive A to the C:\9700 directory.
			A:\>COPY NODE1.* C:\9700	Copies all files with the NODE1 root name from the floppy disk in drive A to the C:\9700 directory.
			C:\>COPY A:\*.* C:\9700	Copies all files from the floppy disk in drive A to the C:\9700 directory.
			C:\9700>COPY NODE1.* A:	Copies all files with the NODE1 root name from the C:\9700 directory to the A drive.

**Table I. DOS Command Reference (Continued)**

Command†	Switch††	Description	Example(s)§¶	
File and Disk Management Commands (Continued)				
DEL		Deletes a single file or a group of files from the specified location. <b>NOTE:</b> You can restore deleted files using the UNDELETE command. <b>WARNING:</b> Be careful that you do not delete necessary system or configuration files.	C:\>DEL C:\9700\OLDFILE.MON  C:\9700>DEL OLDFILE.MON  C:\>DEL A:OLDFILE.MON  A:\>DEL OLDFILE.MON  C:\9700>DEL OLDFILE.*	Deletes the OLDFILE.MON file from the C:\9700 directory.  Deletes the OLDFILE.MON file from the C:\9700 directory.  Deletes the OLDFILE.MON file from the floppy disk in drive A.  Deletes the OLDFILE.MON file from the floppy disk in drive A.  Deletes all files with the OLDFILE root name from the C:\9700 directory.
	/P	Prompts you for confirmation before deleting a file.	C:\9700>DEL OLDFILE.* /P	Prompts you for confirmation before deleting each file with the OLDFILE root name from the C:\9700 directory.
EDIT		Starts the MS-DOS editor, which is a text editor that can be used to create and edit ASCII text files.	C:\9700>EDIT STARTUP.BAT	Allows you to edit the startup.bat file.
FORMAT		Formats a disk for use with DOS. If data is present on the disk, the data is erased. <b>WARNING:</b> Do not format the C: drive.	C:\>FORMAT A:	Formats the floppy disk in drive A for use with DOS.
	/S	Transfers operating system files to a newly formatted floppy disk that can be used as the system disk, allowing you to boot from the disk.	C:\>FORMAT A:\S	Transfers operating system files to a newly formatted floppy disk in drive A.
REN		Changes the name of a single file or a group of files. For information about DOS filename conventions, refer to the <i>DOS Filename Conventions</i> section.	—	—

**Table I. DOS Command Reference (Continued)**

Command <sup>†</sup>	Switch <sup>††</sup>	Description	Example(s) <sup>§¶</sup>	
File and Disk Management Commands <i>(Continued)</i>				
TYPE		Displays the contents of the specified text file on the screen. If the location of the file is in a directory other than the one you are in, you must specify the directory path.	C:\9700>TYPE NODE1.MON  C:\>TYPE C:\9700\NODE1.MON	Displays the contents of the NODE1.MON file located in the C:\9700 directory  Displays the contents of the NODE1.MON file located in the C:\9700 directory
	MORE	Allows a long text file to be viewed one screen at a time. The   redirection operator symbol precedes the MORE command. The symbol is located above the backslash (\) on the keyboard.	C:\ TYPE C:\9700\NODE1.ALM   MORE	Allows the NODE1.ALM text file to be viewed one screen at a time
UNDELETE		Recovers files that were previously deleted using the DEL command.	C:\UNDELETE C:\9700\TEST.BAT	Recovers the TEST.BAT file that was previously deleted using the DEL command.
	/LIST	Lists the deleted files that are available to be recovered but does not recover any files.	C:\UNDELETE C:\9700\ /LIST	Lists the files that have been deleted from the C:\9700 directory and are available to be recovered but does not recover the files.
	/ALL	Recovers deleted files without prompting for confirmation for each file	C:\UNDELETE C:\9700\ /ALL	Recovers all files that have been deleted from the C:\9700 directory without prompting for confirmation for each file
Environment Commands				
PATH		Displays the current search path used when DOS looks for a program file.	C:\>PATH	—
PATH <i>[drive:][path[:...]]</i>		Sets the search path to be used when DOS looks for a program file	C:\>PATH C:;C:\DOS;C:\WINDOWS	Sets the search path to C:;C:\DOS;C:\WINDOWS
Miscellaneous Commands				
CLS		Clears the screen. Only the command prompt and cursor remains.	C:\>CLS	Clears the screen. The following remains: C:\>_
FASTHELP		Lists and briefly describes MS-DOS commands. Provides less detail than the information provided by the HELP command (see below).	C:\>FASTHELP	—

**Table I. DOS Command Reference (Continued)**

Command <sup>†</sup>	Switch <sup>††</sup>	Description	Example(s) <sup>§¶</sup>	
Miscellaneous Commands (Continued)				
FASTHELP <i>command</i>		Briefly describes the specified command. Provides less detail than the information provided by HELP <i>command</i> (see below).	C:\FASTHELP DIR	Displays brief information about the DIR command.
HELP		Starts the MS-DOS command reference, which provides detailed information about MS-DOS commands.	C:\HELP	—
HELP <i>command</i>		Displays detailed information about the specified command only.	C:\HELP DIR	Displays detailed information about the DIR command.
MORE		Displays one screen of information at a time. Can also be used with the TYPE command when viewing a long text file. When MORE follows a command, the   redirection operator symbol is used. The symbol is located above the backslash (\) on the keyboard.	C:\DIR C:\DOS   MORE	Displays the contents of the DOS directory one screen at a time.
VER		Displays the current version of DOS.	C:\VER	—
<p><sup>†</sup>DOS commands can be entered in lowercase or uppercase.</p> <p><sup>††</sup>A switch modifies the way DOS carries out a command. Generally, a switch consists of a forward slash (/) followed by one or more letters or numbers.</p> <p><sup>§</sup>An asterisk (*) used in the examples denotes a wildcard. The asterisk matches any character in that position and all the positions that follow. The asterisk can be used to manage (for example, copy or delete) a group of configuration files without the need to manage each configuration file individually.</p> <p><b>NOTE:</b> The root directory does not have a name. It is simply referred to as a backslash (\). Entering the CD\ command from any directory always returns you to the root directory, which is denoted by the command prompt C:\&gt;.</p>				



# System Diagnostics

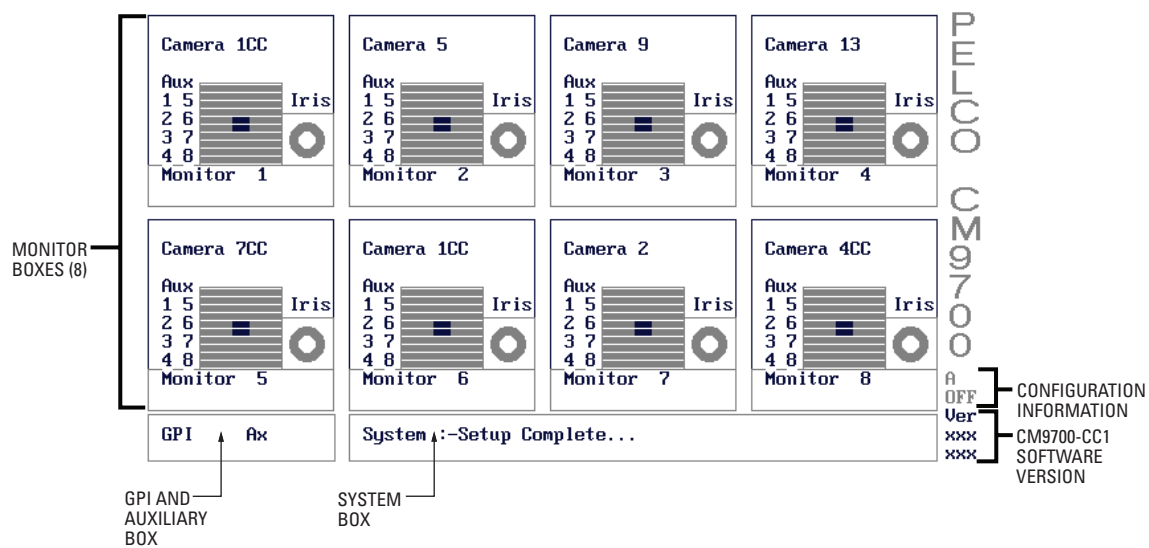
The 9760 system provides diagnostic screens that allow you to monitor single-node and multi-node status. This section provides information about the following:

- Monitoring CM9700-CC1 functions using the CM9700-CC1 diagnostic screen and associated PC keyboard commands
- Viewing multi-node system status using the CM9700-NW1 diagnostic screen and associated PC keyboard commands

**NOTE:** Additional displays, such as those provided by the CM9700-MGR Main window and the CM9760-KBD LCD, also provide information about system status. For detailed information, refer to the product-specific documentation.

## MONITORING CM9700-CC1 FUNCTIONS

The CM9700-CC1 provides a diagnostic screen that allows you to monitor CM9700-CC1 functions. You can view the diagnostic screen on a VGA monitor that is connected to the VGA port on the rear of the CM9700-CC1. The diagnostic screen appears after the CM9700-CC1 initializes. Refer to Figure 35 for a sample CM9700-CC1 diagnostic screen.



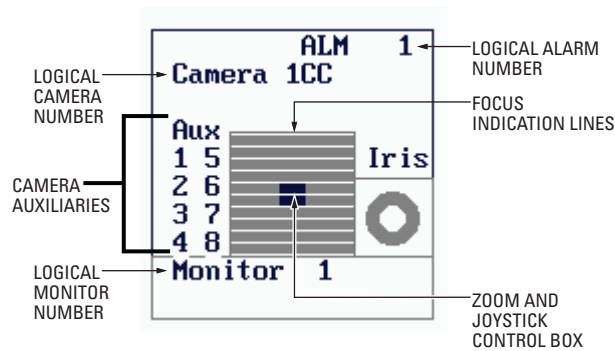
**Figure 35.** Sample CM9700-CC1 Diagnostic Screen

As illustrated in Figure 35, the CM9700-CC1 diagnostic screen displays the following items:

- **Monitor boxes:** Up to eight monitor boxes are displayed on the CM9700-CC1 diagnostic screen at one time. Each monitor box represents a monitor and the camera currently being displayed on that monitor (for detailed information about the monitor box, refer to the *Viewing Monitor Box Diagnostics* section).
- **GPI and auxiliary box:** Displays GPI and auxiliary information (if applicable):
  - GPI displays the GPI currently selected. The GPI number is updated when an auxiliary command is executed.
  - Ax displays the auxiliary currently selected and whether the auxiliary is on or off.
- **System box:** Displays system status messages, error messages, and responses to commands issued from the PC keyboard that is connected to the AT-compatible port of the CM9700-CC1.
- **Configuration information:** Indicates whether the CM9700-CC1 is part of a CM9760-HS hot switch configuration. Note that *A OFF* indicates that the CM9700-CC1 is not part of a hot switch configuration. (The letter *A* indicates asynchronous mode.) For detailed information about the diagnostic screen in a hot switch configuration, refer to the CM9760-HS Hot Switch Installation/Operation manual.
- **CM9700-CC1 software version:** Displays the software version number (xxx xxx) of the CM9700.EXE executable file (for example, version 903 023 which represents version 9.03.023).

## VIEWING MONITOR BOX DIAGNOSTICS

The monitor box on the CM9700-CC1 diagnostic screen provides information about the monitor, camera, auxiliary conditions, and alarms currently being displayed. Refer to Figure 36 for a sample monitor box.



**Figure 36.** Sample Monitor Box on CM9700-CC1 Diagnostic Screen

As illustrated in Figure 36, a monitor box displays the following information:

- Logical camera number: Identifies the logical number of the selected camera. Note that the letters *CC* denote that the camera is a controllable camera. If the letters *CC* do not appear for a particular camera, the camera is a fixed camera.
- Camera auxiliary numbers 1-8: Indicate whether auxiliaries 1-8 are on or off. An auxiliary number appears white when the corresponding auxiliary is off and changes color when the corresponding auxiliary is turned on.
- Logical monitor number: Identifies the logical number of the selected monitor.
- Logical alarm number: Identifies the logical number of an alarm that has been triggered.
- Focus indication lines: Indicate when a camera is focused near or far. When a camera is focused near, the distance between the lines increases. When a camera is focused far, the distance between the lines decreases.
- Iris: Indicates when the iris of the camera is being opened or closed. When the iris is being opened, the black area inside the circle increases. When the iris is being closed, the black area decreases.
- Zoom and joystick control box: Indicates when a camera is zoomed in or out. When a camera is zoomed in, the box becomes larger. When a camera is zoomed out, the box becomes smaller.

The box also displays camera movement by mimicking joystick control.

Note that each monitor box that is assigned to a camera is displayed in a color. The color of the monitor box changes when a different camera is selected. When a monitor box appears empty, a camera is not selected.

## ALLOCATING MONITORS TO MONITOR BOXES

When the diagnostic screen appears on the VGA monitor after the CM9700-CC1 is initialized, the first eight monitors are displayed in the eight monitor boxes. Using the PC keyboard connected to the AT-compatible keyboard port of the CM9700-CC1, you can allocate a different monitor to a monitor box by using the function keys F1 through F8. The function keys correspond to the monitor boxes:

- The top four monitor boxes are 1 to 4 (from left to right); therefore, F1 corresponds to monitor box 1, F2 corresponds to monitor box 2, and so on.
- The bottom four monitor boxes are 5 to 8; therefore, F5 corresponds to monitor box 5, F6 corresponds to monitor box 6, and so on.

To allocate a monitor to a monitor box, do the following:

1. Press the function key corresponding to the monitor box to which you want to assign a different monitor. For example, press F1 if you want to assign monitor box 1 a different monitor.

In the System box, the following prompt appears:

Allocate Box [x] to ?

where x is the number of the desired monitor box (1-8). For example, pressing the F1 key causes the following prompt to appear:

Allocate Box 1 to ?

2. Enter the number of the monitor you want to assign to the monitor box, and then press the Enter key.

The desired monitor is displayed in the monitor box.

## ENTERING CM9700-CC1 PC KEYBOARD COMMANDS

Using the PC keyboard connected to the AT-compatible keyboard port of the CM9700-CC1, you can enter commands to perform certain functions or to obtain system status information in the System box on the diagnostic screen. Refer to Table J for a list of CM9700-CC1 functions and associated PC keyboard commands.

**Table J.** CM9700-CC1 PC Keyboard Command Functions

Function	Keyboard Command	System Box Display Message
Allocate monitor box 1 to 8 on diagnostic screen	Function key F1 to F8, which correspond to monitor box 1 to 8, respectively	Example: Pressing F1 to allocate monitor box 1 results in the following message: Allocate Box 1 to ? (Refer to the <i>Allocating Monitors to Monitor Boxes</i> section for additional information.)
Stop system operation	Ctrl+Q	Exit to DOS prompt <b>NOTE:</b> When Ctrl+Q is entered, the 9760 system stops operating and the C:\9700 prompt appears. The CM9760-KBDs go offline and the time and date titling on the monitor outputs from the CM9760-MXB stop at XX:XX:59. Operators then lose control of the system. It is recommended that system operation be stopped during off-peak hours if possible.
Display number of messages to be printed	Alt+O	Total Ptr Msg => 0 <b>NOTE:</b> Printer port is reserved for future use.
Display port parameters	Alt+A	Example: 1 - ATNRQ (IRQ 10) Connected to SER1 <b>NOTE:</b> Toggling the Alt+A key combination cycles through all allocated IRQs and associated connections as configured.
Display operator logged-on parameters	Alt+J	Example: LogOn—Opr1, KB2,Pin1111,Port 7,index2 <b>NOTE:</b> Toggling the Alt+J key combination cycles through operators.
Display system alarm parameters	Alt+K	Example: Sys:3 Auto:0 1
	Alt+Z	Example: (10,0) (10,0) (10,0) (10,0)
Display/set time adjustment parameters	Alt+L	Last Adj. 0 : 0. 0 Total 0: 0 . 0 (Refer to the <i>System Programming Using DOS</i> section for detailed information about setting and adjusting time in a single-node system.)
	Shift+ESC	Last Adj. 0 : 0. 0 Total 0: 0 . 0.60 <b>NOTE:</b> The Shift+ESC command must follow the Alt+L command.
Display operator alarm parameters	Alt+C	Example: Kb2 Alms 0 Alarm 0 0 0 0 FIO 0 0
Display alarm sequence parameters	Alt+B	Cur0, Alms0-0 0 0 0 Cams0-0 0 0 0
Display configuration filename	Alt+N	Example: Configuration file is NODE1
Display number of peripheral devices connected to the system	Alt+V	Example: Port10 Node1 NIU0 Cam16 Mon8 Kbd11 <b>NOTE:</b> Continue toggling for entire list of peripheral devices.
Toggle printer port on/off	Alt+P	Printer not allocated <b>NOTE:</b> Printer port is reserved for future use.

**Table J. CM9700-CC1 PC Keyboard Command Functions (Continued)**

Function	Keyboard Command	System Box Display Message
Toggle system error printing on/off	Alt+R	System Error Print ON or System Error Print OFF <b>NOTE:</b> Printer port is reserved for future use.
Toggle system synchronization diagnostic trap on/off	Alt+T	Resynch Trap Offline or Resynch Trap Online
Toggle system diagnostics on/off. When system diagnostics is off, the diagnostic screen is visible but is not updated.	Alt+D	Demo On or Demo Off
Toggle system error reporting on/off. When system error reporting is off, the System box is not updated with system error messages. When a visual display of error reporting is not necessary, it is recommended that error reporting be turned off to reduce system load.	Alt+S	System on or System off
Toggle between master/slave units, PC keyboard, and monitor using ChangeOver system	Alt+M	—
Trigger alarm points 1 to 9 (test function)	Shift + function key F1 to F9, which correspond to alarm points 1 to 9, respectively	—
Clear message displayed in System box	Space bar	—

# VIEWING MULTI-NODE SYSTEM STATUS

The CM9700-NW1 provides a diagnostic screen that displays multi-node system status during the initialization of the CM9700-NW1 and any changes in system status that occur after the initialization process. Refer to Figure 37 for a sample CM9700-NW1 diagnostic screen.

```
PELCO CM9700 N.I.U. Ver xxx xxx
Vector initialized
2nodes.niu
  Com init COM1
ATNRQ 3 (IRQ 5) Connected to _ _ _ _
ATNRQ 4 (IRQ 10) Connected to SER 1
ATNRQ 6 (IRQ 11) Connected to SER 2
ATNRQ 7 (IRQ 12) Connected to SER 3
ATNRQ 5 (IRQ 7) Connected to _ _ _ _
ATNRQ 2 (IRQ 4) Connected to COM 1
ATNRQ 1 (IRQ 3) Connected to _ _ _ _
ATNRQ 0 (IRQ 15) Connected to _ _ _ _

Fri Jul 23 11:46:10 2005      Port 8 Request download
Fri Jul 23 11:46:11 2005      Port 8 on line
Fri Jul 23 11:47:13 2005      Port 8 Receiving Monitor parameters
Fri Jul 23 11:47:16 2005      Port 8 Receiving Camera parameters
Fri Jul 23 11:47:17 2005      Port 8 Received Tie Line parameters
Fri Jul 23 11:47:18 2005      Port 8 Received Operator parameters
```

**Figure 37.** Sample CM9700-NW1 Diagnostic Screen

As the CM9700-NW1 initializes, the SERCOM ports of the CM9700-NW1 are set up according to the CM9700-NW1 configuration file. The CM9700-NW1 then polls each of the SERCOM ports and requests download information about the setup of each port. As shown in Figure 37, the CM9700-NW1 diagnostic screen displays the hardware configuration of the CM9700-NW1 and then displays the downloaded information about each of the SERCOM ports connected to a CM9700-CC1 as each port is polled. The CM9700-NW1 reports that a port is online (for example, port 8 is online) and displays the status of setup information for the port (for example, received operator parameters). In addition, date and time information is also displayed for each status condition. The CM9700-NW1 continues to poll until each port connected to a CM9700-CC1 has responded with the download information. The diagnostic screen also indicates when the CM9700-MGR PC, referred to as the Admin PC, goes online.

The CM9700-NW1 diagnostic screen changes only when a change in system status occurs. For example, if port 8 is online (as shown in Figure 37) but then goes offline, the diagnostic screen then displays the offline condition including the date and time of the occurrence:

```
Fri Jul 24 15:23:13 2005      Port 8 off line
```

When port 8 goes online, the diagnostic screen then displays the online condition including the date and time of the occurrence:

```
Fri Jul 24 16:20:23 2005      Port 8 on line
```

The diagnostic screen also indicates a change in status of the CM9700-MGR PC. For example, the diagnostic screen displays the following when the CM9700-MGR PC goes offline and then back online:

```
Fri Jul 23 16:21:32 2005      Admin PC off line
Fri Jul 23 16:30:24 2005      Admin PC on line
```

## ENTERING CM9700-NW1 PC KEYBOARD COMMANDS

Using the keyboard connected to the AT-compatible keyboard port of the CM9700-NW1, you can enter commands to perform certain functions. Refer to Table K for a list of CM9700-NW1 functions and associated keyboard commands.

**Table K.** CM9700-NW1 PC Keyboard Command Functions

Function	Keyboard Command
Display operator/node information	Alt+O
Display/set time adjustment parameters*	Alt+L
Display system version level	Alt+N
Display tie line information	Alt+T
Display updated tie line information	Alt+X
Toggle CM9700-NW1 system diagnostics on/off. When system diagnostics is off, the CM9700-NW1 diagnostic screen is visible but is not updated.	Alt+S
Stop operation of the CM9700-NW1 (operation of CM9700-CC1 nodes continue)	Ctrl+Q
*Refer to the <i>System Programming Using DOS</i> section for detailed information about setting and adjusting time in a multi-node system.	

# Troubleshooting

This section provides the following troubleshooting information for the 9760 system:

- General troubleshooting guidelines
- CM9700-CC1 hardware and system error troubleshooting
- CM9760-MXB troubleshooting using the CM9760-MXB LEDs

For additional troubleshooting information relating to other 9760 system devices, refer to the manual supplied with the device.

## GENERAL TROUBLESHOOTING GUIDELINES

Begin troubleshooting a problem with the 9760 system by perform the following troubleshooting steps as appropriate:

1. Ensure that all power cords are attached.
2. Ensure that all power switches are in the ON position.
3. Ensure that all cables are installed in the proper location and are fully seated.
4. Ensure that all cards are installed in the proper location and are fully seated.
5. Ensure that all DIP switches and jumpers are properly set.

## TROUBLESHOOTING THE CM9700-CC1

Problems with the CM9700-CC1 may occur due to the following:

- CM9700-CC1 hardware errors (refer to Table L)
- CM9700-CC1 system errors, which are displayed as error messages in the System box on the CM9700-CC1 diagnostic screen (refer to Table M)
- CM9700-CC1 configuration file errors
- DOS operating system errors, which are displayed on the VGA monitor as the CM9700-CC1 initializes
- Peripheral devices connected to the CM9700-CC1

**Table L. CM9700-CC1 Hardware Error Troubleshooting**

Hardware Error	Possible Cause	Corrective Action
Green power LED does not light.	No AC power to the unit	Check power cord connection.
	Blown fuse	Replace fuse.
VGA monitor display does not appear.	Video cable not seated properly	Check cable connection to VGA port.
	Power cord not connected	Connect power cord.
	Defective VGA card	Replace VGA card.



**Table M. CM9700-CC1 System Error Troubleshooting**

<b>System Error Message</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
Port x ERR Coms Framing	Mismatched baud rate settings	Correct the baud rate setting in the CM9700-MGR to match the settings in the device connected to the specified port.
Port x ERR Coms Fatal	Failure of communications line after power up and initialization	Check and correct hardware fault.
Port x ERR Coms Parity	Mismatched parity settings	Correct the parity setting in the CM9700-MGR to match the settings in the device connected to the specified port.
Port x ERR Coms Max Retry	If the communications line is faulty (wired incorrectly or not seated properly), the diagnostic screen displays this error. If the communications line fails after power-up and initialization, then a Port x ERR Coms Fatal error appears, followed by a Port x ERR Max Retry message.	Check and correct hardware fault.
	Temporary communications fault	Fault will automatically be corrected when communications resume.
	Noise on the data line	Check data cables.

## TROUBLESHOOTING THE CM9760-MXB

If a problem exists with the matrix bay, reset operation of the unit by pressing the Reset button located on the front of the CM9760-VMC video output card. All information, such as camera and monitor IDs, is reloaded from the CM9700-CC1. If the problem still exists, refer to Table N for additional troubleshooting information.

**Table N.** Troubleshooting Using CM9760-MXB Diagnostic LEDs

LED Color	Possible Cause	Corrective Action
<b>CM9760-VCC Video Input Card LEDs</b>		
+10 VDC Power LED (CR2) not lit	Defective fuse(s) on CM9760-VCC card	Remove and inspect fuses on card. Replace fuse if defective.
-10 VDC Power LED (CR3) not lit	Defective fuse(s) on CM9760-VCC card	Remove and inspect fuses on card. Replace fuse if defective.
Red Comm Fail LED (CR1)	Card not seated properly	Reseat the card.
	Defective CM9760-VCC card	Replace the card.
Red Comm Fail LEDs on all CM9760-VCC cards. (Red Comm Fail LED also on CM9760-VMC)	CM9760-VMC video output card must be reset.	Press the Reset button on the CM9760-VMC card. If all Comm Fail LEDs remain red, the CM9760-VMC card is defective.
	Defective CM9760-VMC card	Replace the card.
<b>CM9760-VMC Video Output Card LEDs</b>		
+10 VDC power LED (DS5) not lit	Defective fuse(s) on CM9760-VMC card	Remove and inspect fuses on card. Replace fuse if defective.
-10 VDC power LED (DS4) not lit	Defective fuse(s) on CM9760-VMC card	Remove and inspect fuses on card. Replace fuse if defective.
Red Comm Fail LED (DS6) on CM9760-VMC only	Cable between the CM9760-MXB and the CM9700-CC1 is not connected properly or is not installed in the proper location.	Check cable connections. Check that cable is connected to correct CM9700-CC1 port.
	Incorrect wiring of cable	Check wiring of cable if not using supplied data communication cable.
	Port communication setup is incorrect, for example, incorrect baud rate or device type	Check port configuration settings in CM9700-MGR.
<b>Power Supply Module LEDs</b>		
+10V Power LED not lit	Power supply not seated properly	Ensure that power supply is seated properly.
	Blown fuse	Replace fuse.
-10V Power LED not lit	Power supply not seated properly	Ensure that power supply is seated properly.
	Blown fuse	Replace fuse.
Flashing red Frame Fault LED	Failure of one or more video input/output cards. Refer to the <i>CM9760-VCC Video Input Card LEDs</i> and <i>CM9760-VMC Video Output Card LEDs</i> sections above for possible causes.	Refer to the <i>CM9760-VCC Video Input Card LEDs</i> and <i>CM9760-VMC Video Output Card LEDs</i> sections above for corrective actions.
Red Supply Fault LED	Failure of associated power supply module	Replace power supply module.

# CM9700-CC1 Controller

---

This section provides detailed information about the CM9700-CC1. The following information is provided:

- Description of the functions of the CM9700-CC1
- Front and rear views of the CM9700-CC1
- Description of the DOS directory structure of the CM9700-CC1

**NOTE:** For CM9700-CC1 installation information, refer to the *System Setup* and *CM9700-CC1 Component Installation or Replacement* sections.

## DESCRIPTION

The CM9700-CC1 is the central processing unit (CPU) of the 9760 system. All components of the 9760 system connect to and communicate with the CM9700-CC1.

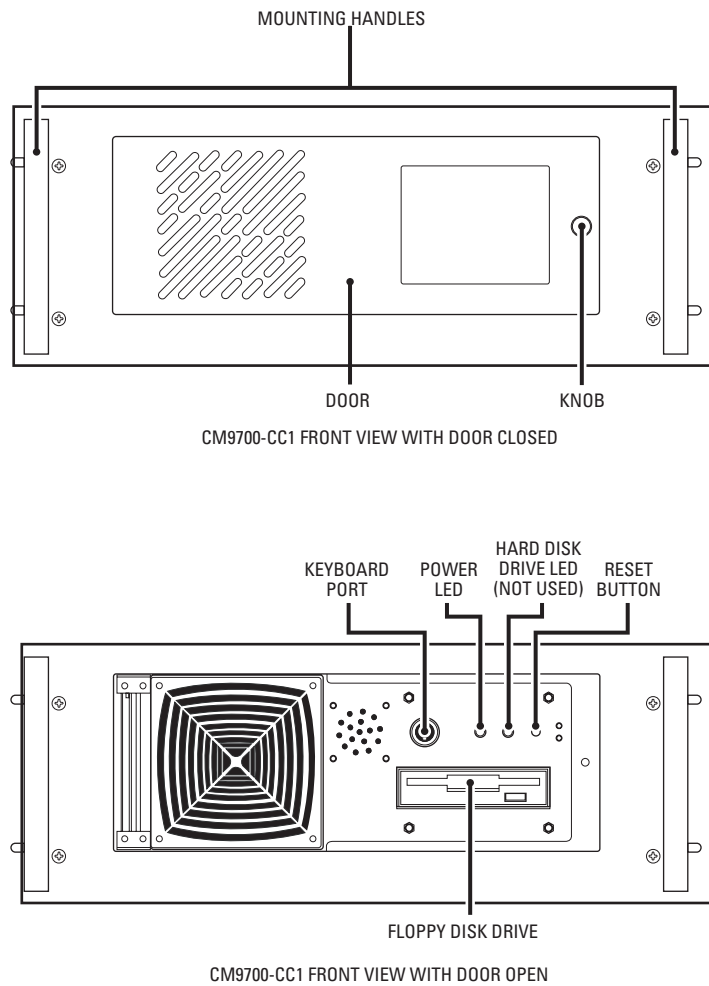
The CM9700-CC1 runs under DOS 6.22. For a description of the DOS directory structure of the CM9700-CC1, refer to the *Directory Structure* section.

Note the following:

- To ensure uninterrupted operation, a backup CM9700-CC1 can be added to a 9760 system by means of the CM9760-HS hot switch. For additional information, refer to the *System 9760 CM9760-HS Hot Switch Installation/Operation* manual.
- The CM9700-CC1 can be networked by means of the CM9760-NW1 network interface unit (NIU). For additional information, refer to the *System 9760 Networking Guide*.

## FRONT VIEW

Figure 38 illustrates the front of the CM9700-CC1.



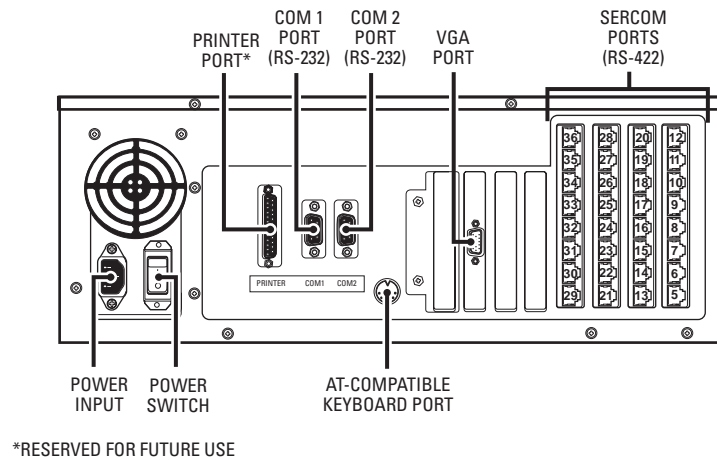
**Figure 38. CM9700-CC1 Front View**

Note the following:

- The door of the CM9700-CC1 is secured by a Phillips-head screw on the knob. To open the door, loosen the screw on the knob.
- In addition to the AT-compatible keyboard port on the front of the CM9700-CC1, another AT-compatible keyboard port is located on the rear of the unit. Both keyboard ports cannot be used at the same time.
- The power LED lights green to indicate that AC power is being applied to the unit.
- Because of the solid state flash memory of the CM9700-CC1, the hard disk drive LED is not used.

## REAR VIEW

Figure 39 illustrates the rear of the CM9700-CC1.



**Figure 39. CM9700-CC1 Rear View**

As illustrated in Figure 39, the rear of the CM9700-CC1 includes the following:

- Printer port: Female DB25 connector (reserved for future use)
- Physical ports 1-2 and 5-36:
  - COM 1 (port 1) and COM 2 (port 2): Male DB9 connectors for RS-232 serial communication. COM 1 is configured at the factory for connection to the CM9700-MGR PC.
  - Serial communication (SERCOM) ports 5-36: Female RJ-45 connectors for RS-422 communication to system devices such as CM9760-MXBs and CM9760-KBDs.

The default configuration of the CM9700-CC1 contains 16 SERCOM ports (ports 5-20). The ports are provided by two CM9700-SER serial communication cards installed on the CM9700-CC1 motherboard. Each card provides 8 SERCOM ports. Depending on system requirements, up to two additional CM9700-SER cards can be ordered, providing up to 16 additional ports (ports 21-36). If four CM9700-SER cards are installed, the total number of SERCOM ports is 32. For information about adding or replacing CM9700-SER cards in an existing system, refer to *Installing or Replacing a CM9700-SER Card* in the *CM9700-CC1 Component Installation or Replacement* section.

Note that a maximum of 120 SERCOM ports can be achieved with a configuration of 3 CM9700-SER cards (8 ports each) and 3 CM9700-SER-32 port expander assemblies (32 ports each). For information about CM9700-SER-32 port expander assemblies, refer to the CM9700-SER-32 Port Expander Installation/Operation manual.

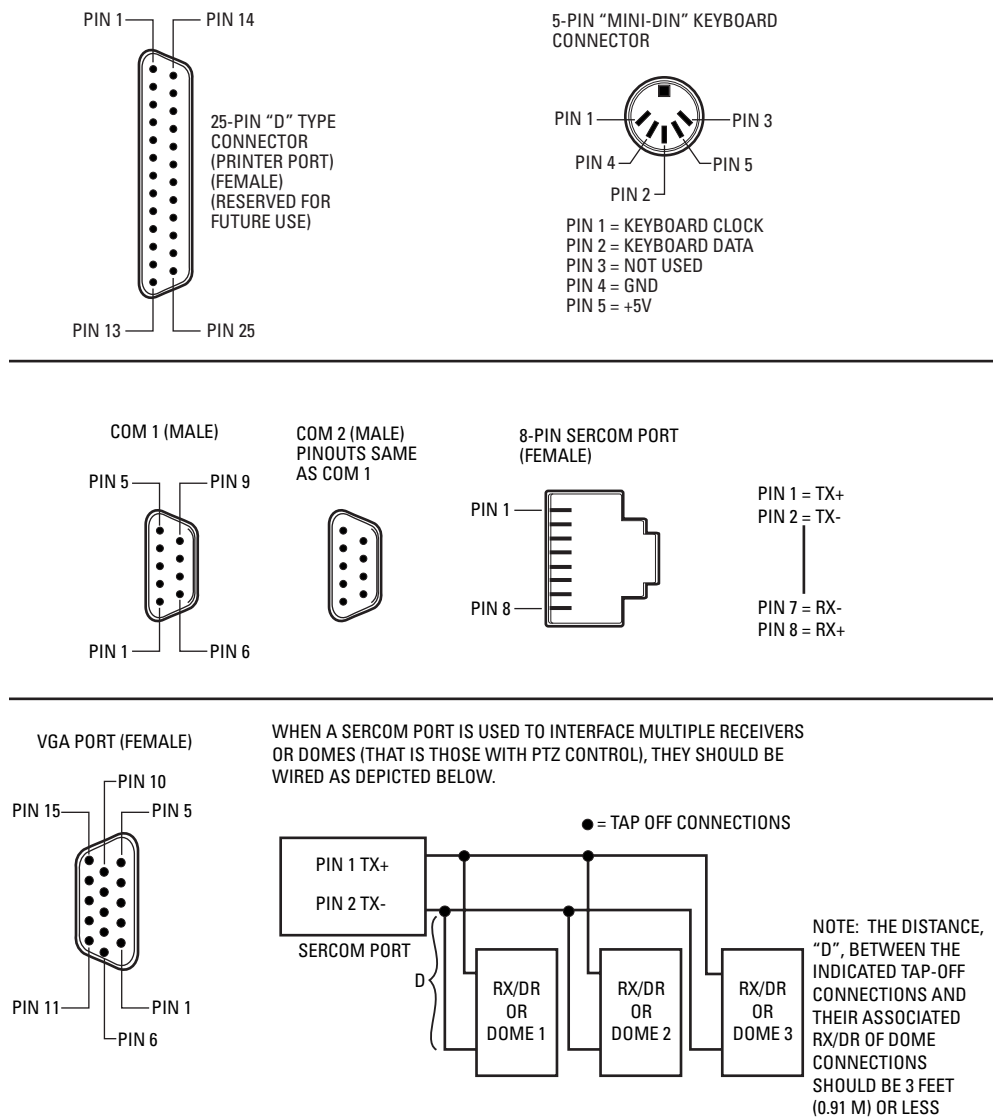
**NOTE:** Ports 3 and 4 are not present on the CM9700-CC1.

- VGA port: Female DB15 connector that connects to a VGA monitor, which allows you to view system diagnostics. For additional information about system diagnostics, refer to the *System Diagnostics* section.
- AT-compatible keyboard port: 5-pin mini DIN connector that connects to the supplied PS/2-to-AT keyboard adapter for connection to the supplied PS/2 keyboard.

**NOTE:** An AT-compatible keyboard port also exists on the front of the CM9700-CC1 behind the front door (refer to Figure 38). Both keyboard ports cannot be used at the same time.

- AC power input connector: Three-prong connector that connects to the supplied power cord. The acceptable power range is 120 VAC to 230 VAC. The power supply automatically adjusts to the proper voltage range.
- Power switch: Rocker-type switch used to power the CM9700-CC1 on or off.

Figure 40 illustrates pinouts of connectors on the rear of the CM9700-CC1.



**Figure 40.** CM9700-CC1 Rear Connector Pinouts

## DIRECTORY STRUCTURE

The directory structure of the CM9700-CC1 consists of the C:\ root directory, which contains several subdirectories and files. You can view the contents of the root directory by entering **dir** and then pressing Enter at the C:\ prompt (refer to Figure 41).

```
11:16:15.93 Tue 07-19-2005 C:\>dir

Volume in drive C has no label
Volume Serial Number is 1B13-0FD8
Directory of C:\

COMMAND   COM           54,645  05-31-94   6:22a
WINA20    386           9,349  05-31-94   6:22a
TVDISP    EXE          13,608  02-26-97   2:25p
CONFIG    SYS            82  10-14-97  10:03a
README    TV           1,873  07-23-99   4:55p
AUTOEXEC  BAT            73  07-19-05  11:05a
9700      <DIR>          07-19-05  10:54a
TESTPORT  <DIR>          07-19-05  10:54a
9760      <DIR>          07-19-05  10:54a
NETWORK   <DIR>          07-19-05  10:54a
TVPARA    DAT            850  07-19-05  11:00a
DOS        <DIR>          04-11-05   2:38p
          12 file(s)  80,480 bytes
          25,313,280 bytes free
11:16:17.96 Tue 07-19-2005 C:\>
```

**Figure 41.** CM9700-CC1 Root Directory

**NOTE:** The number of bytes shown at the bottom of the root directory list of your CM9700-CC1 may differ from the number of bytes shown in Figure 41 depending on the configuration of your particular system.

As shown in Figure 41, the root directory contains the following subdirectories (indicated by <DIR>):

- 9700 directory
- TESTPORT directory
- DOS directory

The following sections provide information about each of the above directories contained within the root directory.

**NOTE:** As shown in Figure 41, the root directory also contains a 9760 directory and a NETWORK directory. The 9760 directory and the NETWORK directory are not used by the CM9700-CC1.

## 9700 DIRECTORY

The 9700 directory is the working directory of the CM9700-CC1. From the root directory, you can navigate to the 9700 directory by entering **cd 9700** and then pressing Enter. The C:\9700 prompt appears.

To view the contents of the 9700 directory, enter **dir** and then press Enter (refer to Figure 41).

```
11:24:32.17 Tue 07-19-2005 C:\9700>dir
Volume in drive C has no label
Volume Serial Number is 1B13-0FD8
Directory of C:\9700

.                <DIR>                07-19-05   10:54a
..               <DIR>                07-19-05   10:54a
CM9700  EXE             916,208  01-26-05   10:16a
GSERVER DRV           65,478  03-11-96   1:47p
HELVB   FON           50,880  11-12-87   1:25p
STARTUP BAT           19      03-15-04   2:09p
NODE1   ALM            74      07-19-05   1:17p
NODE1   CAM          1,912  07-19-05   1:17p
NODE1   GPI            75      07-19-05   1:17p
NODE1   IDN            75      07-19-05   1:17p
NODE1   LCM            74      07-19-05   1:17p
NODE1   MAC            75      07-19-05   1:17p
NODE1   MSG           120      07-19-05   1:17p
NODE1   MON          1,464  07-19-05   1:17p
NODE1   PIN           117      07-19-05   1:17p
NODE1   SCP           2,630  07-19-05   1:17p
NODE1   SYM            227      07-19-05   1:17p
    17 file(s)         1,039,428 bytes
                        25,304,389 bytes free

11:24:34.26 Tue 07-19-2005 C:\9700>
```

**Figure 42.** CM9700-CC1 9700 Directory

As shown in Figure 42, the 9700 directory includes the following CM9700-CC1 system software files:

- CM9700.EXE: System executable file that runs under the MS-DOS 6.22 operating system. When the CM9700-CC1 boots, the CM9700.EXE file executes the operational software and loads configuration files (discussed below) for system operation.
- Configuration files, which consist of the following:

NODEx.ALM (alarm setup file)	NODEx.MSG (message setup file)
NODEx.CAM (camera setup file)	NODEx.MON (monitor setup file)
NODEx.GPI (GPI setup file)	NODEx.PIN (operator setup file)
NODEx.LCM (link camera setup file)	NODEx.SCP (communication setup file)
NODEx.MAC (macro setup file)	NODEx.SYM (system setup file)

where NODEx is the root name and x equals the node number. For a single-node system, the root name of the configuration files is NODE1 as shown in Figure 42. For each node within a multi-node system, configuration file root names are numbered sequentially according to the CM9700-NW1 port number to which each CM9700-CC1 is connected, for example, NODE5 and NODE6 in a two-node system.

Note the following:

- The NODEx.IDN configuration file that appears in the C:\9700 directory is not used.
- The number of bytes shown for the configuration files and the number of bytes shown at the bottom of the 9700 directory listing may vary from the numbers shown in Figure 42 depending on the particular configuration of your system.

Note that the 9700 directory also contains the startup.bat file. The startup.bat file is a batch file (a file that contains a sequence of commands) that automatically loads the CM9700.EXE system executable file and all configuration files. The default startup.bat file reads as follows:

```
CM9700 NODEx
```

where:

x is the node number, for example, 1 for a single-node system (NODE1).



## TESTPORT DIRECTORY

The TESTPORT directory contains files that can be used to test whether the RJ-45 communication ports on the rear of the CM9700-CC1 are functioning. From the root directory, you can change to the TESTPORT directory by entering **cd testport** and then pressing Enter. The C:\TESTPORT prompt appears.

To view the contents of the TESTPORT directory, enter **dir** and then press Enter (refer to Figure 43).

```
14:29:02.30 Tue 07-19-2005 C:\TESTPORT>dir
Volume in drive C has no label
Volume Serial Number is 1B13-0FD8
Directory of C:\TESTPORT

.                <DIR>                02-16-99    8:11a
..               <DIR>                02-16-99    8:11a
TESTPORT CAM      3,548 04-22-97    12:50p
TESTPORT GPI      3,548 04-22-97    12:50p
TESTPORT MON      3,548 04-22-97    12:50p
TESTPORT MSG      3,548 04-22-97    12:50p
TESTPORT PIN      3,548 04-22-97    12:50p
TESTPORT SCP      3,548 04-22-97    12:50p
TESTPORT MAC      3,548 04-22-97    12:50p
TESTPORT SYM      3,548 04-22-97    12:50p
TESTPORT BAT      3,548 04-22-97    12:50p
               11 file(s)              9,889 bytes
               2,133,393,408 bytes free

14:29:03.18 Tue 07-19-2005 C:\TESTPORT>
```

**Figure 43.** CM9700-CC1 TESTPORT Directory

## DOS DIRECTORY

The DOS directory contains the commands and programs associated with MS-DOS. From the root directory, you can access the DOS subdirectory by entering **cd dos** and then pressing Enter. The C:\DOS prompt appears.

To view the contents of the DOS directory, enter **dir** and then press Enter. A list of files in the DOS directory scrolls quickly. To be able to view the contents one screen at a time, enter **dir/p** and then press Enter. If you also want to display the contents in wide format, enter **dir/w/p** and then press Enter.

Note that the HELP file is contained within the DOS directory. The HELP file provides information about MS-DOS commands. To view the HELP file from the C:\DOS directory, enter **help** and then press Enter.

The MS-DOS command reference appears, which provides detailed information about the various MS-DOS commands.

**NOTE:** You can access the HELP file at any command prompt by entering help. You do not need to be in the DOS directory to access the HELP file.

For additional information about DOS as it relates to the 9760 system, refer to the *System Programming Using DOS* section.

# CM9760-MXB Matrix Bay

---

This section provides detailed information about the CM9760-MXB. The following information is provided:

- Description of the functions of the CM9760-MXB
- Front and rear views of the CM9760-MXB
- Description of the CM9760-VCC video input card and CM9760-VMC video output card, which are installed into the front of the CM9760-MXB
- Description of the CM9760-RPC, CM9760-RPL, CM9760-RPM, CM9760-DFC, and CM9760-DFL rear panel cards
- Description of the power supplies that can be used in the matrix bay
- Overview of sideframing and downframing configurations

**NOTE:** For CM9760-MXB installation information, refer to the *System Setup* and *CM9760-MXB Component Installation or Replacement* sections.

## DESCRIPTION

The CM9760-MXB matrix bay communicates with the CM9700-CC1 via an RS-422, full-duplex, asynchronous communication interface and performs all video switching functions as directed from the CM9700-CC1. The CM9760-MXB provides all video input and output connections for the 9760 system. A single CM9760-MXB accepts up to 256 video inputs and up to 16 video outputs. Multiple bays can be used to expand the system to a maximum of 2,048 video inputs and 128 video outputs.

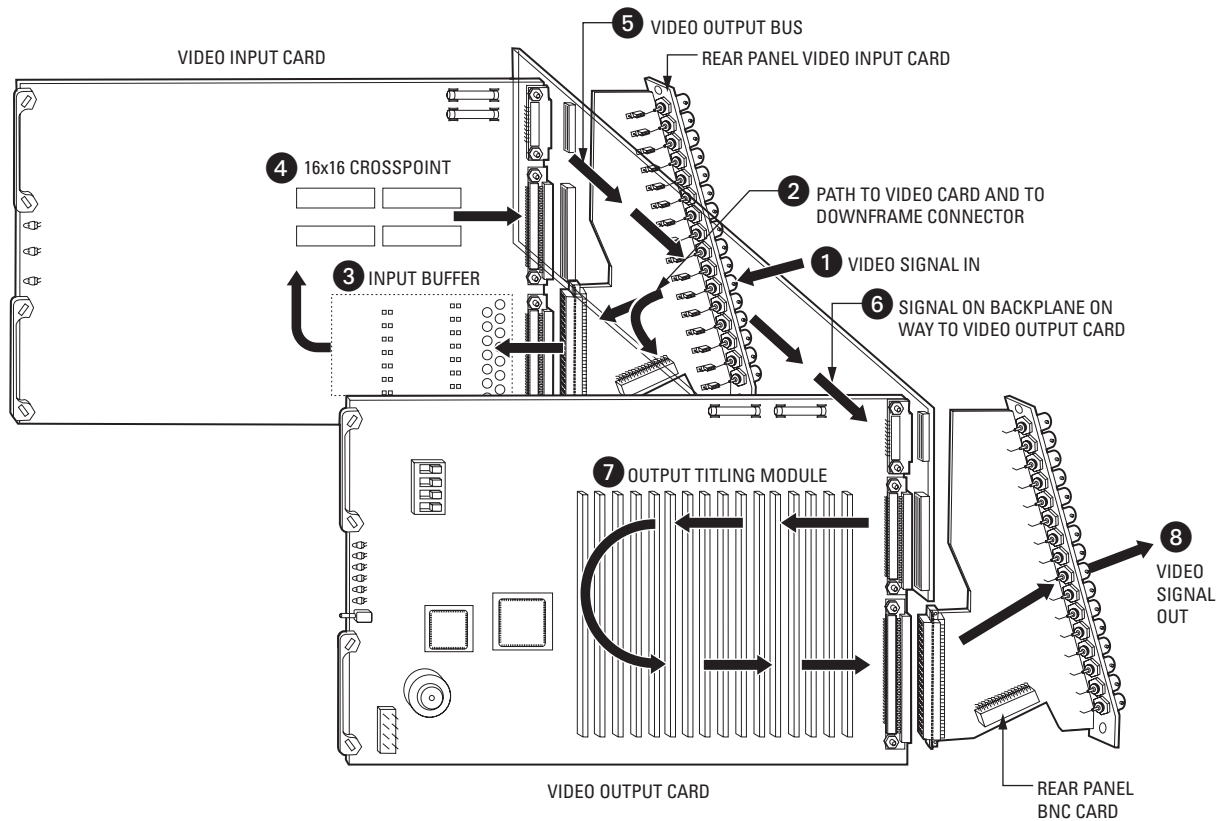
**NOTE:** You can increase video output capacity to a maximum of 512 by using CM9760-MDA units. For information about the CM9760-MDA, refer to the CM9760-MDA Master Distribution Amplifier Installation/Operation manual.

The matrix bay operates on either 120 VAC or 230 VAC input and can accept up to two power supplies: a main power supply and a backup power supply. If the main power supply fails, the backup power supply automatically powers the unit, providing power redundancy to the system.

All connections are made on the rear of the unit. All inputs are terminated with 75 ohms (default). When applicable, inputs can be unterminated by means of a jumper selection.

## FUNCTIONAL SYSTEM OVERVIEW

The CM9760-MXB is a crosspoint switch that supports up to 256 video inputs in increments of 16 and up to 16 video outputs in increments of 4. Figure 44 illustrates video signal flow through the matrix bay.



**Figure 44. Video Signal Flow through the Matrix Bay**

As illustrated in Figure 44, a video signal enters the matrix bay through the rear panel input card where it is terminated with 75 ohms. The signal then proceeds to the CM9760-VCC video input card via the input buffer and is then directed to the 16 x 16 crosspoint switch. Operation of the crosspoint switch is controlled by the CM9760-VMC video output card.

The signal leaves the video input card and is sent to the video output card by way of the video bus. When received by the video output card, the signal is processed by the CM9760-VMM video output module where the DC level of the signal is restored and the titling message is inserted. The edited video signal leaves the matrix bay through the rear panel output card.

The video signal path is controlled by the microprocessor located on the video output card. The video output card has full control of all video input cards. The number of inputs can vary from 16 to 256 in 16-input increments.

The matrix bay can be used as a standalone routing switcher or it can be connected to other matrix bays to create a larger system.

# FRONT VIEW

Figure 45 illustrates the CM9760-MXB with the front panel removed.

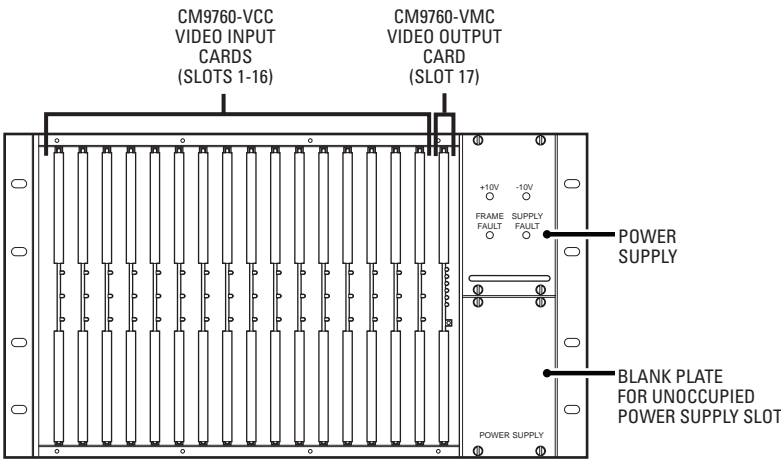


Figure 45. CM9760-MXB Front View (Front Panel Removed)

As illustrated in Figure 45, the front of the matrix bay accommodates the following:

- Up to 16 CM9760-VCC video input cards in slots 1-16. For detailed information about CM9760-VCC cards, refer to the *CM9760-VCC Video Input Card* section.
- One CM9760-VMC video output card in slot 17. For detailed information about CM9760-VMC cards, refer to the *CM9760-VMC Video Output Card* section.
- Up to two power supplies. For additional information about the power supplies, refer to the *Power Supplies* section.

# REAR VIEW

All connections to the CM9760-MXB are made to the rear of the unit. Figure 46 illustrates the rear of the CM9760-MXB in a single-bay configuration.

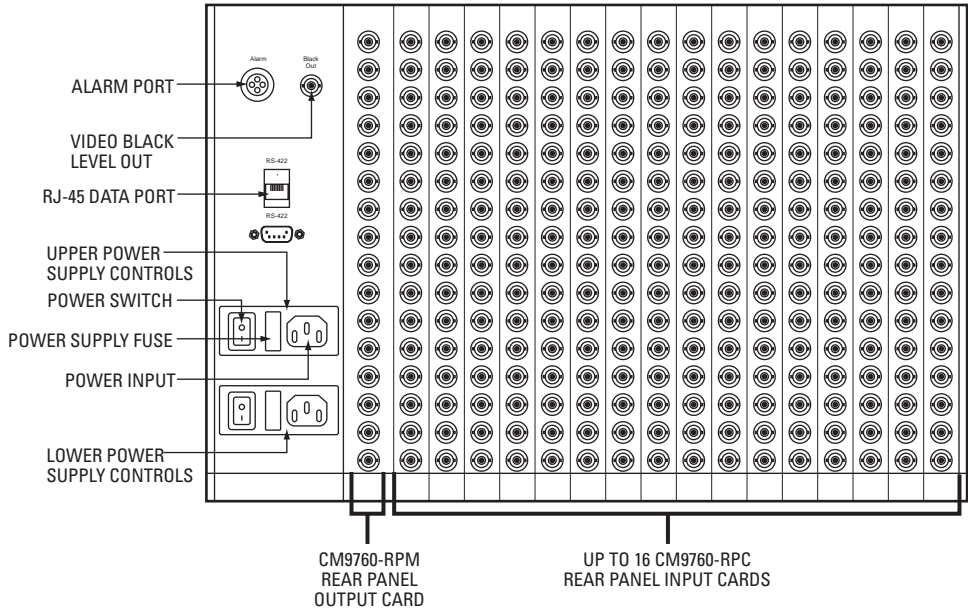


Figure 46. CM9760-MXB Rear View (Single-Bay Configuration)

As illustrated in Figure 46, the rear of the matrix bay in a single-bay configuration accommodates the following:

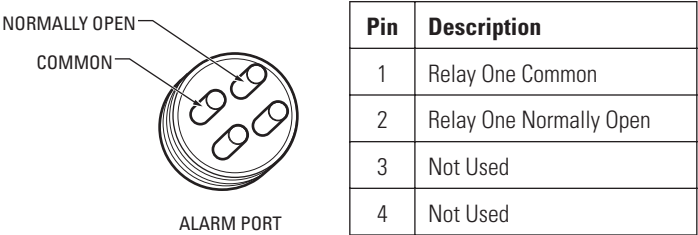
- Up to 16 CM9760-RPC rear panel input cards, providing connection to up to 256 video inputs. For additional information about CM9760-RPC cards, refer to the *CM9760-RPC Rear Panel Input Card* section.

Note that CM9760-RPL rear panel looping cards can also be used. For detailed information, refer to the *CM9760-RPL Rear Panel Looping Card* section.

- One CM9760-RPM rear panel output card in the leftmost slot, providing connection to up to 16 video outputs. For additional information about the CM9760-RPM card, refer to the *CM9760-RPM Rear Panel Output Card* section.
- Alarm port: Four-pin audio connector that provides an alarm relay contact closure, which activates remote alarm equipment if the matrix bay malfunctions. The contact closure closes if any of the following occurs:
  - Power supply failure
  - Frame fault including fuse failure on the CM9760-VCC video input card
  - CM9760-VMC video output card failure
  - Communication fault with a CM9760-VCC or CM9760-VMC card

The alarm port operates in conjunction with the Frame Fault and Supply Fault LEDs on the front of the power supply.

To wire the alarm port, refer to Figure 47.



**Figure 47. CM9760-MXB Alarm Port**

- Video black level output connector: BNC connector that can be used as a reference sync output to allow for the genlocking of peripheral devices. The signal level for the output is 300 mV. The output is terminated with 75 ohms.
- RJ-45 data port: Female serial communication data port that connects to a female RJ-45 serial communication data port on the rear of the CM9700-CC1 for RS-422 communication.
- Power input panels providing upper and lower power supply controls:
  - Power switch
  - Power supply fuse assembly
  - AC power input

## VIDEO INPUT AND OUTPUT CARDS

The CM9760-MXB accommodates up to 16 CM9760-VCC video input cards and one CM9760-VMC video output card. The cards are installed into the front of the matrix bay (behind the front panel).

### CM9760-VCC VIDEO INPUT CARD

The CM9760-VCC video input card (refer to Figure 48) accepts up to 16 video input signals and performs the actual video switching in the bay. The CM9760-VCC card can switch any one of 16 video input signals to any video output or to multiple combinations of video outputs up to 16. Video input sources (for example, cameras) to the CM9760-VCC card are connected to the associated rear panel BNC card (CM9760-RPC or CM9760-RPL).

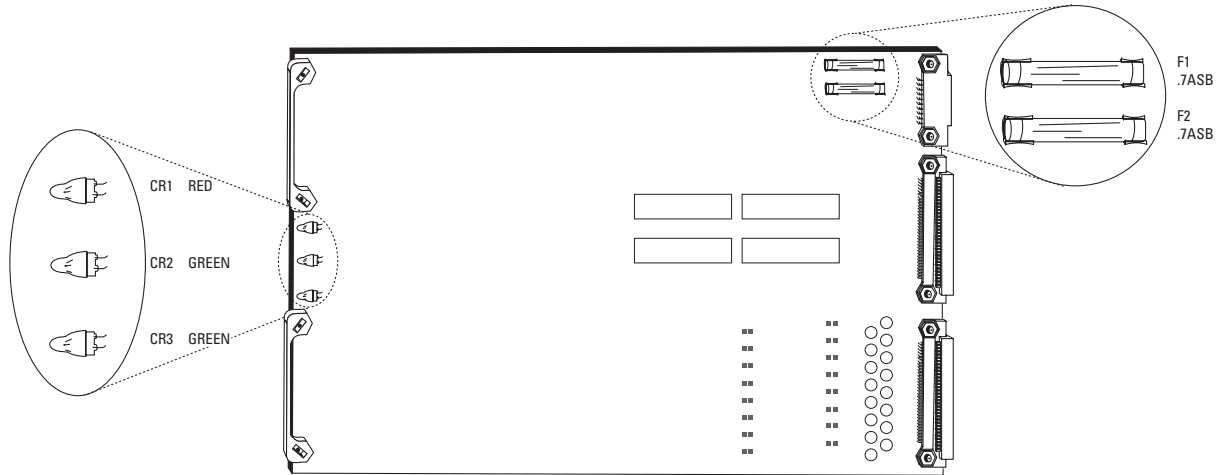


Figure 48. CM9760-VCC Video Input Card

As illustrated in Figure 48, the CM9760-VCC card includes the following:

- CR1, CR2, and CR3 LEDs: Allow you to monitor the operating status of the card:
  - CR1: Lights red to indicate a communication failure with the CM9700-CC1.
  - CR2: Lights green to indicate that the +10 VDC power source is functioning properly.
  - CR3: Lights green to indicate that the –10 VDC power source is functioning properly.
- Power Fuses: Two .7ASB fuses (F1 and F2)

For troubleshooting information relating to the LEDs and fuses on the CM9760-VCC card, refer to *Troubleshooting the CM9760-MXB* in the *Troubleshooting* section.

### CM9760-VCC Card Guidelines

The following guidelines apply to the CM9760-VCC card:

- The CM9760-VCC card can be installed into any available slot ranging from slot 1 to slot 16 in the front of the matrix bay. Up to 16 CM9760-VCC cards can be installed in a single matrix bay. The matrix bay is shipped from the factory with the required number of cards installed in the unit according to the system order. For information about installing additional CM9760-VCC cards or replacing an existing card, refer to *Installing or Replacing a CM9760-VCC Video Input Card* in the *CM9760-MXB Component Installation or Replacement* section.
- Each slot position into which a CM9760-VCC can be installed (1-16) corresponds to a specific range of physical inputs; for example, slot position 1 corresponds to physical inputs 1-16, slot position 2 corresponds to physical inputs 17-32, and so on. Physical input numbers are used when programming the CM9760-MXB using the CM9760-MGR; therefore, if you do not install CM9760-VCC cards in sequential order, be sure to use the correct physical input number when programming the system. Refer to *Installing a CM9760-VCC Card* in the *CM9760-MXB Component Installation or Replacement* section for a complete list of CM9760-VCC slot positions and their corresponding physical input range.
- The CM9760-VCC card can connect to various rear panel cards:
  - In a non-looping single-bay configuration, the CM9760-VCC card connects to a CM9760-RPC card.
  - In a single-bay configuration that requires looping, the CM9760-VCC card connects to a CM9760-RPL card.
  - In a sideframed matrix bay, the CM9760-VCC card connects to a CM9760-RPC card. (For additional information about sideframing, refer to the *Sideframing* section.)
  - In a downframed matrix bay, the CM9760-VCC card connects to a CM9760-DFC card or to a CM9760-DFL card. (For additional information about downframing, refer to the *Downframing* section.)

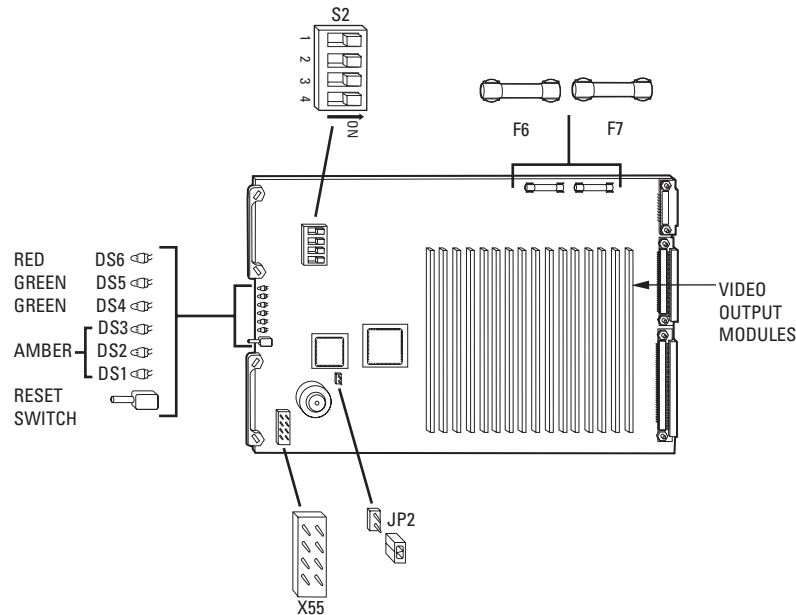
For detailed information about rear panel cards, refer to the *Rear Panel Cards* section.

## CM9760-VMC VIDEO OUTPUT CARD

The CM9760-VMC video output card (refer to Figure 49) routes up to 16 video signals from the video bus, adds idents (if applicable), and routes the signals to video outputs (for example, monitors). The CM9760-VMC card contains up to 16 CM9760-VMM video output modules—each of which provides one video output with titling—and is available in the following models:

- CM9760-VMC4 contains 4 CM9760-VMM modules, providing support for 4 video outputs.
- CM9760-VMC8 contains 8 CM9760-VMM modules, providing support for 8 video outputs.
- CM9760-VMC12 contains 12 CM9760-VMM modules, providing support for 12 video outputs.
- CM9760-VMC16 contains 16 CM9760-VMM modules, providing support for 16 video outputs (refer to Figure 49).

**NOTE:** The number of video outputs supported by CM9760-VMC4, CM9760-VMC8, and CM9760-VMC12 cards can be expanded to a maximum of 16 by installing additional CM9760-VMM video output modules. For CM9760-VMM installation instructions, refer to *Installing a CM9760-VMM Video Output Module* in the *CM9760-MXB Component Installation or Replacement* section.



**Figure 49.** CM9760-VMC Video Output Card (CM9760-VMC16)

As illustrated in Figure 49, the CM9760-VMC card includes the following:

- DS4, DS5, and DS6 LEDs: Allow you to monitor the operating status of the card:
  - DS4: Lights green to indicate that the +10 VDC power source is functioning properly.
  - DS5: Lights green to indicate that the –10 VDC power source is functioning properly.
  - DS6: Lights red to indicate a communication failure with the CM9700-CC1.

For troubleshooting information relating to the LEDs, refer to *Troubleshooting the CM9760-MXB* in the *Troubleshooting* section.

**NOTE:** The DS1, DS2, and DS3 LEDs light amber but have no assignment.

- Reset Button: Pressing the button resets operation of the CM9760-VMC card. All information, such as camera and monitor idents, is reloaded from the CM9700-CC1.
- Power Fuses: Two 0.7ASB fuses (F6 and F7). For troubleshooting information relating to the power fuses, refer to *Troubleshooting the CM9760-MXB* in the *Troubleshooting* section.
- S2 DIP Switch: Determines the communication baud rate, the video standard, and whether video loss detection is enabled or disabled. Refer to *Installing a CM9760-VMC Card* in the *CM9760-MXB Component Installation or Replacement* section for S2 DIP switch functions and associated settings.
- X55 Jumper: Eight-pin header that determines the video standard for video black generator operation. Refer to *Installing a CM9760-VMC Card* in the *CM9760-MXB Component Installation or Replacement* section for video standards and associated jumper positions.
- JP2 Jumper: Two-pin header that controls the program loading sequence. A jumper must always be installed for proper operation.

## CM9760-VMC Card Guidelines

The following guidelines apply to the CM9760-VMC card:

- The CM9760-VMC card must be installed into slot 17 in the front of the matrix bay. The matrix bay is shipped from the factory with the card installed in the unit according to the system order.
- The CM9760-VMC card connects to the CM9760-RPM card, which is installed into the associated slot in the rear of the matrix bay. For information about the CM9760-RPM card, refer to the *CM9760-RPM Rear Panel Output Card* section.
- S2 DIP switch and X55 and JP2 jumpers are configured properly according to your system order. If you install a new CM9760-VMC card, you must configure the DIP switch and jumpers as required for your system.

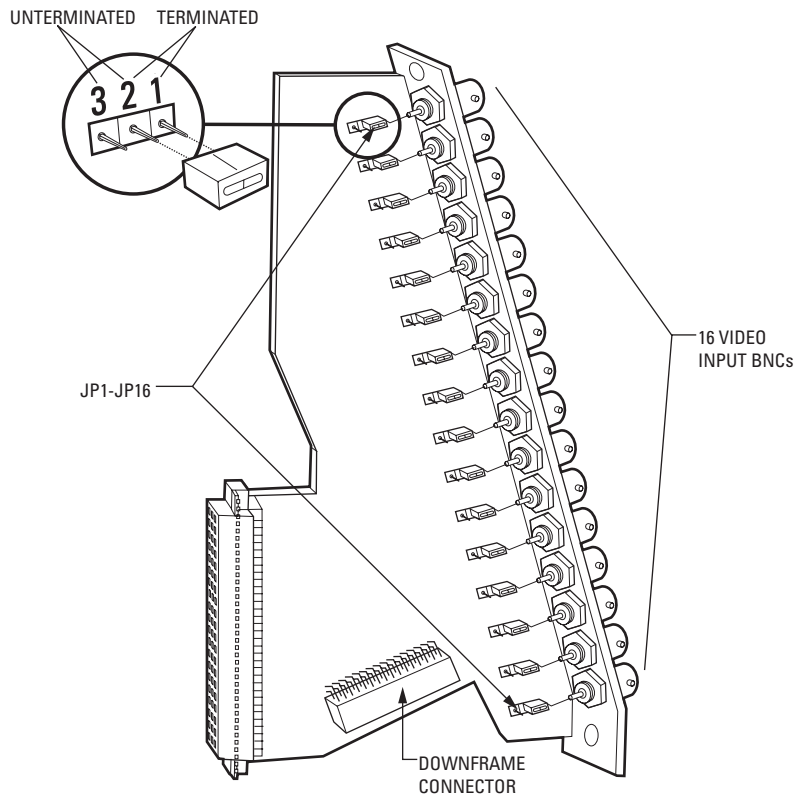
## REAR PANEL CARDS

The matrix bay accommodates the following cards, which are installed into the rear of the matrix bay:

- CM9760-RPC: BNC card for video input connections
- CM9760-RPL: Double-wide BNC card for single-bay looping of video inputs
- CM9760-RPM: BNC card for video output connections
- CM9760-DFC: Downframe card with 32-pin connectors (non-looping)
- CM9760-DFL: Downframe looping BNC card

### CM9760-RPC REAR PANEL INPUT CARD

The CM9760-RPC rear panel input card (refer to Figure 50) provides 16 BNCs that connect to video input sources such as cameras. The CM9760-RPC card passes up to 16 external video signals to the CM9760-VCC video input card.



**Figure 50.** CM9760-RPC Rear Panel Input Card



As illustrated in Figure 50, the CM9760-RPC card includes the following:

- BNC Connectors (16): Provide the physical connection point for coaxial cable
  - Termination Jumpers JP1-JP16: Determine whether video is to be terminated ( jumper positions 1 and 2) or unterminated ( jumper positions 2 and 3):
    - In a single-bay configuration (up to 256 cameras and 16 monitors), the setting of the jumpers depends on whether video is to be looped to another device (for example, a DVR, VCR, or matrix switcher):
      - When looping is not required, the jumpers must be set in the terminated position (default position).
      - When looping is required, the jumpers must be set in the unterminated position.
    - In multiple-bay configurations, the jumpers must be set in the unterminated position.
- The jumpers are set in the appropriate position when your system is configured at the factory. However, if you change your system—for example, add or replace a card—you may need to change the termination.
- Downframe Connector: Sixteen-pin connector that connects to a downframed bay by means of a downframe cable.

### CM9760-RPC Card Guidelines

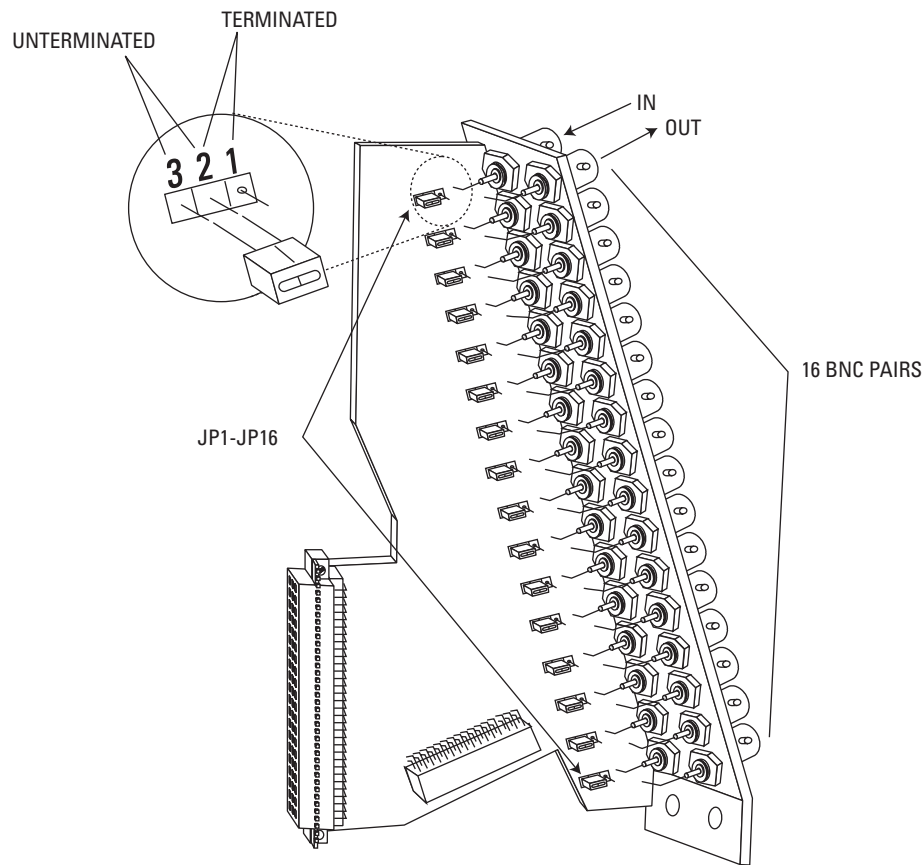
The following guidelines apply to the CM9760-RPC card:

- The CM9760-RPC card connects to a CM9760-VCC video input card, which is installed into the front of the matrix bay. Up to 16 CM9760-RPC cards can be inserted into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards.
- The CM9760-RPC card must be installed *before* the associated CM9760-VCC video input card is installed into the front of the matrix bay.
- When installing a new card, termination jumpers must be set in the proper position: terminated or unterminated.

### CM9760-RPL REAR PANEL LOOPING CARD

The CM9760-RPL rear panel looping card (refer to Figure 51) allows the looping of video. The card contains 16 pairs of BNC connectors that loop video from video input sources such as cameras to video output devices such as DVRs, VCRs, and matrix switchers. Because of the two rows of BNC connectors, the CM9760-RPL card requires two slot positions in the matrix bay. The CM9760-RPL card connects to one CM9760-VCC video input card.

When a maximum of 128 video inputs is required in a system that also requires looping, up to eight CM9760-RPL cards can be used in a CM9760-MXB.



**Figure 51. CM9760-RPL Rear Panel Looping Card**

As illustrated in Figure 51, the CM9760-RPL card includes the following:

- BNC Connectors (16 pairs): Provide the physical connection point for coaxial cable. For each pair of BNC connectors, one connector connects to a video source and the other connector connects to the video output device to which the video is looped.
- Termination Jumpers JP1-JP16: Determine whether video is to be terminated (jumper positions 1 and 2) or unterminated (jumper positions 2 and 3):
  - When looping functions are required, the termination jumpers must be set in the unterminated position.
  - When looping functions are not required, the jumpers must be set in the terminated position.

The jumpers are set in the appropriate position when your system is configured at the factory. However, if you change your system—for example, add or replace a card—you may need to change the termination.

- Downframe Connector: Sixteen-pin connector that connects to a downframed bay by means of a downframe cable.

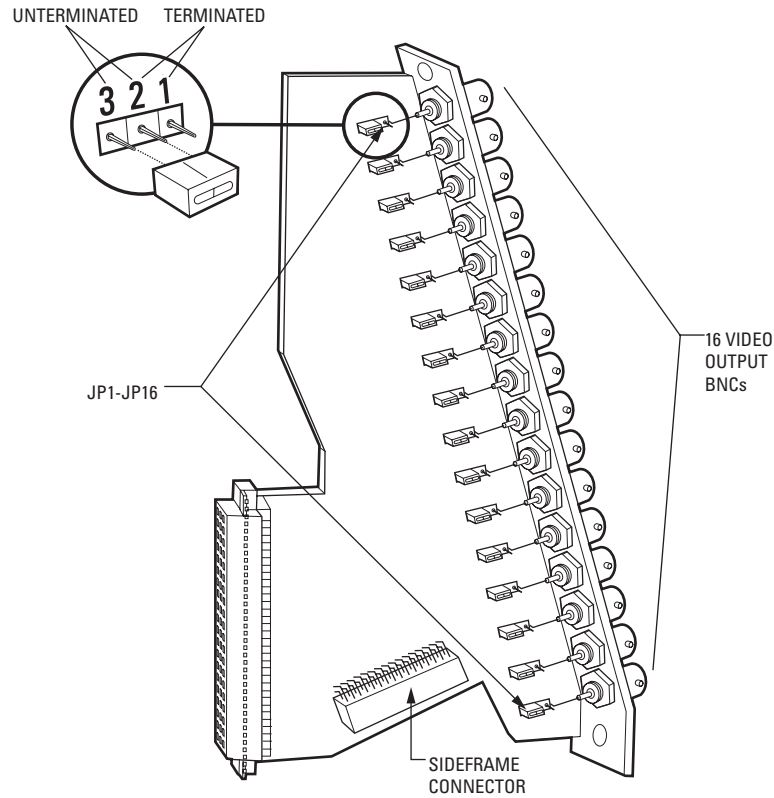
## CM9760-RPL Card Guidelines

The following guidelines apply to the CM9760-RPL card:

- The CM9760-RPL card connects to a CM9760-VCC video input card, which is installed into the front of the matrix bay.
- The CM9760-RPL card must be installed *before* the associated CM9760-VCC video input card is installed into the front of the matrix bay.
- In a bay that is to be fully populated with CM9760-RPL cards, note the following:
  - The cards must be installed into odd slot positions only. The corresponding CM9760-VCC cards must also occupy odd slot positions.
  - The maximum number of video inputs in a matrix bay that is fully populated with CM9760-RPL cards is 128.
- When installing a new card, termination jumpers must be set in the proper position: terminated or unterminated.

## CM9760-RPM REAR PANEL OUTPUT CARD

The CM9760-RPM rear panel output card (refer to Figure 52) passes up to 16 video signals from the CM9760-VMC video output card to video output devices such as monitors, VCRs, and matrix switchers. The CM9760-RPM card provides 16 BNCs that connect to video output devices.



**Figure 52. CM9760-RPM Rear Panel Output Card**

As illustrated in Figure 52, the CM9760-RPM card includes the following:

- BNC Connectors (16): Provide the physical connection point for coaxial cable
- Termination Jumpers JP1-JP16: Allow video to be terminated (jumper positions 1 and 2) or unterminated (jumper positions 2 and 3). Note that the termination jumpers on the CM9760-RPM card must always be set in the unterminated position. You must terminate the video signal at the output device, for example, a monitor or VCR. If you are looping to other devices, terminate the last device only.
- Sideframe Connector: Sixteen-pin connector that connects to a coaxial ribbon cable in a sideframe configuration. A coaxial ribbon cable can be used instead of coaxial cable connections to the BNC connectors on the CM9760-RPM card. For additional information, refer to the *Sideframing* section.

### CM9760-RPM Card Guidelines

The following guidelines apply to the CM9760-RPM card:

- The CM9760-RPM card must always be installed into the leftmost slot on the rear of the matrix bay. The leftmost slot provides the connection point to the CM9760-VMC video output card, which is always inserted into slot 17 in the front of the matrix bay.
- The CM9760-RPM must be installed *before* the CM9760-VMC video output card is installed into the front of the matrix bay.
- Termination jumpers must always be set in the unterminated position.

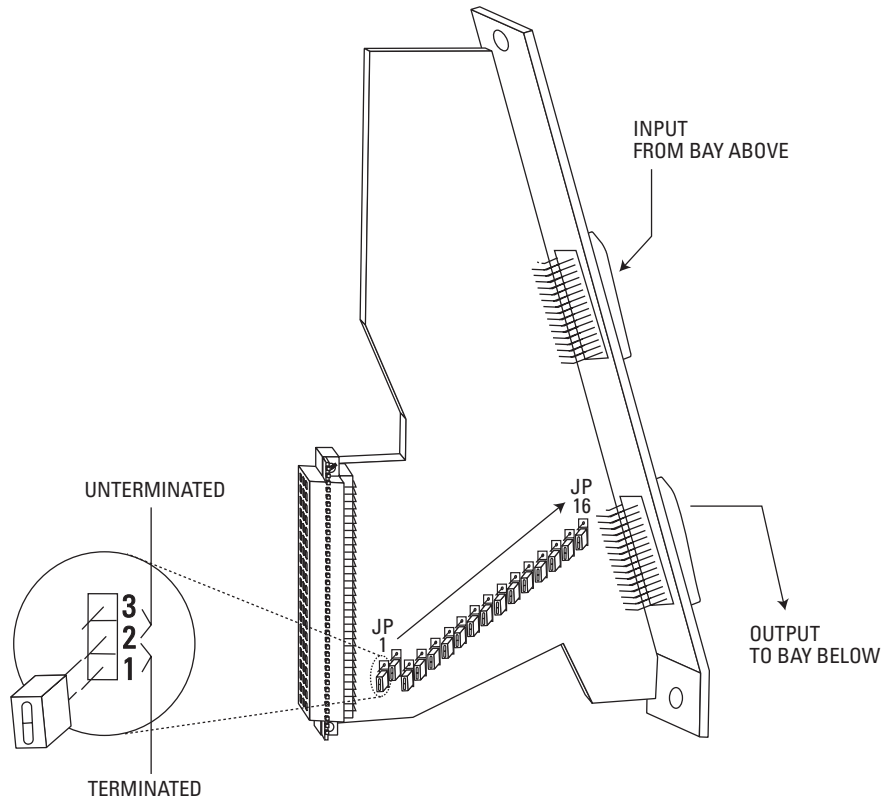
## CM9760-DFC REAR PANEL DOWNFRAME CARD

The CM9760-DFC rear panel card (refer to Figure 53) is used in a downframe configuration. The card is installed in every bay between the first and last bay to connect the associated intermediate bays. The card can also be used in the last bay if looping is not required.

**NOTE:** Unlike the CM9760-DFL downframe card, the CM9760-DFC downframe card does not provide the ability to loop out video.

The CM9760-DFC card connects to a CM9760-VCC video input card, which is installed into the front of the matrix bay.

A downframe cable is supplied with the CM9760-DFC card. For additional information about downframing, refer to the *Downframing* section.



**Figure 53. CM9760-DFC Downframe Card**

As illustrated in Figure 53, the CM9760-DFC card includes the following:

- Termination Jumpers JP1-JP16: Allow video to be terminated (jumper positions 1 and 2) or unterminated (jumper positions 2 and 3):
  - When CM9760-DFC cards are used in intermediate bays, termination jumpers must be set in the unterminated position.
  - When CM9760-DFC cards are used in the last bay, termination jumpers must be set in the terminated position.

Termination jumpers are set in the appropriate position when your system is configured at the factory. However, if you change your system—for example, add or replace a card—you may need to change the termination.

- Input Connector: Thirty-two pin male connector that connects to a downframe cable, which then connects to the rear panel card in the bay above.
- Output Connector: Thirty-two pin male connector that connects to a downframe cable, which then connects to the rear panel card in the bay below.

### CM9760-DFC Card Guidelines

The following guidelines apply to the CM9760-DFC card:

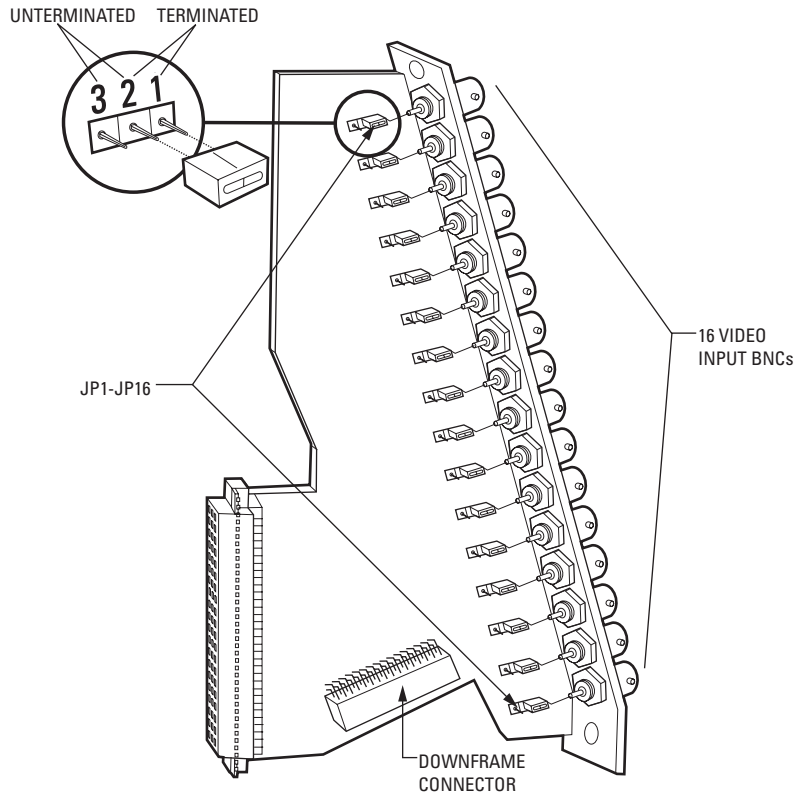
- Within each bay in a downframe configuration, up to 16 CM9760-DFC cards can be inserted into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards.
- The CM9760-DFC must be installed *before* the associated CM9760-VCC video input card is installed into the front of the matrix bay.
- When installing a new card, termination jumpers must be set in the proper position: terminated or unterminated.

## CM9760-DFL REAR PANEL DOWNFRAME LOOPING CARD

The CM9760-DFL rear panel card (refer to Figure 54) is used in the last CM9760-MXB(-X) or CM9760-MXBL bay in a downframe configuration. The CM9760-DFL card provides the capability to loop out video—the card provides 16 BNCs that can connect to video output devices such as monitors, VCRs, and matrix switchers. Note, however, that the card can be used in the CM9760-MXB(-X) to increase the number of available video output devices regardless of whether looping is required. When used in the CM9760-MXB(-X), the CM9760-DFL card connects to a CM9760-VCC video input card, which is installed into the front of the matrix bay.

The CM9760-DFL card is the only card that is used in the CM9760-MXBL, which is an unpowered downframed matrix bay that contains 16 DFL card slots for supporting up to 256 video loop-out connections.

A downframe cable is supplied with the CM9760-DFL card. For detailed information about downframing using the CM9760-DFL card, refer to the *Downframing* section and to the *Downframing to the CM9760-MXBL* section as appropriate.



**Figure 54.** CM9760-DFL Downframe Looping Card

As illustrated in Figure 54, the CM9760-DFL card includes the following:

- BNC Connectors (16): Provide the physical connection point for coaxial cable
- Termination Jumpers JP1-JP16: Allow video to be terminated (jumper positions 1 and 2) or unterminated (jumper positions 2 and 3):
  - When looping to another device is required, termination jumpers must be set in the unterminated position. Termination must occur at the final device.
  - When looping is not required, termination jumpers must be set in the terminated position.

The jumpers are set in the appropriate position when your system is configured at the factory. However, if you change your system—for example, add or replace a card—you may need to change the termination.

- Downframe Connector: Sixteen-pin connector that connects to downframe cable

## CM9760-DFL Card Guidelines

The following guidelines apply to the CM9760-DFL card:

- When used in the CM9760-MXB(-X), note the following:
  - Up to 16 CM9760-DFL cards can be inserted into 16 possible slot positions that are associated with the slot positions of the corresponding CM9760-VCC cards.
  - The CM9760-DFL card must be installed *before* the associated CM9760-VCC video input card is installed into the front of the matrix bay.
- When used in the CM9769-MXBL, up to 16 CM9760-DFL cards can be installed.
- When installing a new card, termination jumpers must be set in the proper position: terminated or unterminated.

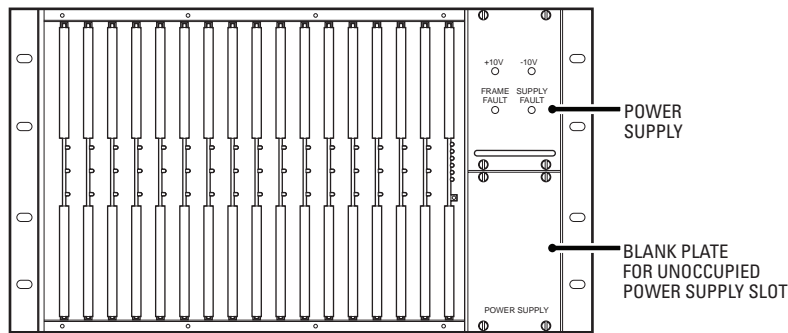
## POWER SUPPLIES

The following power supplies are available for the matrix bay:

- For the CM9760-MXB: Contains up to two CM9760-MPS power supplies, 120 VAC, 60 Hz
- For the CM9760-MXB-X: Contains up to two CM9760-MPS-X power supplies, 230 VAC, 50 Hz

The default configuration of the matrix bay consists of one power supply in the upper power supply slot (refer to Figure 55). A blank plate covers the unoccupied lower power supply slot.

The matrix bay is shipped from the factory with one or two power supplies installed as ordered. If a unit is equipped with two power supplies, one power supply acts as a backup power supply and provides power redundancy to the unit if the other power supply fails.



**Figure 55. Matrix Bay Power Supply**

As illustrated in Figure 55, a power supply contains the following LEDs:

- +10V: Lights green to indicate that the +10 VDC power source is functioning properly.
- -10V: Lights green to indicate that the -10 VDC power source is functioning properly.
- Frame Fault: Flashes red to indicate that the CM9760-VMC video output card or one or more CM9760-VCC video input cards has failed.
- Supply Fault: Lights red to indicate that the power supply has failed.

In addition, note the following about the power supply:

- The power supply provides an audible alarm that operates in conjunction with the Fault LEDs located on the front of the power supply. For information about enabling and disabling the alarm, refer to *Enabling/Disabling the Power Supply Alarm* in the *CM9760-MXB Component Installation or Replacement* section.
- The rear of the matrix bay provides a power switch, power input receptacle, and power supply input fuses for each of two power supplies. For information about replacing a fuse, refer to *Replacing a Power Supply Fuse* in the *CM9760-MXB Component Installation or Replacement* section.

## SIDEFRAMING AND DOWNFRAMING

Sideframing, downframing, or a combination of both sideframing and downframing is required for installation of multiple matrix bays in a 9760 system:

- When expanding video inputs beyond 256 as provided by a single matrix bay, the expansion of video inputs occurs in a horizontal manner using a sideframing configuration. As a result, additional matrix bays must be installed in nearby racks. For detailed information, refer to the *Sideframing* section.
- When expanding video outputs beyond 16 as provided by a single matrix bay, the expansion of video outputs occurs in a vertical manner using a downframing configuration. As a result, additional matrix bays must be installed in the same rack. For detailed information, refer to the *Downframing* section.
- When expanding video inputs beyond 256 and video outputs beyond 16, a combination of sideframing and downframing is used. The maximum capacity of a single-node system is 2,048 video inputs and 128 video outputs. For detailed information, refer to the *Using a Combination of Sideframing and Downframing* section.

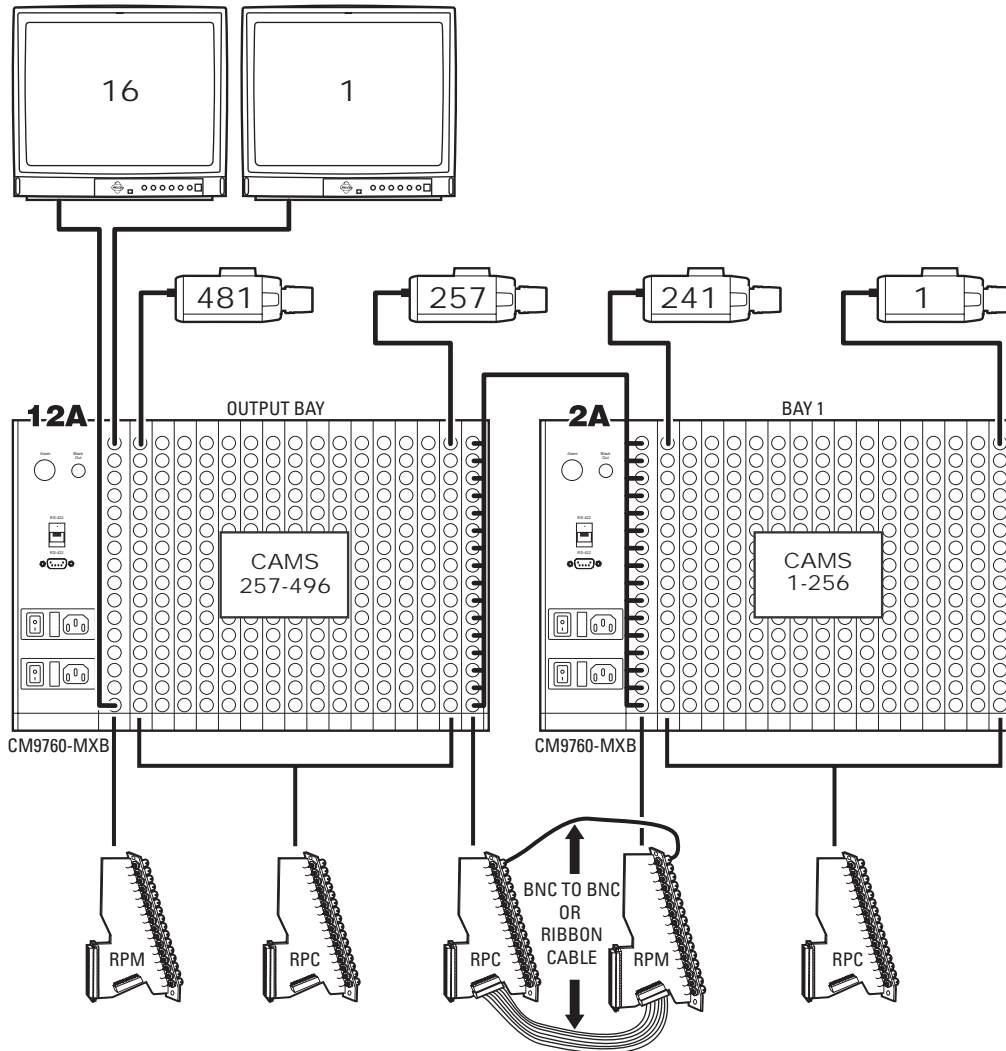
**NOTE:** When using CM9760-MDA units, you can increase the video output capacity to a maximum of 512.

- When more than 128 video inputs and a maximum of 16 video outputs are required in a system that also requires looping, downframing to the CM9760-MXBL is required to loop out the video. For detailed information, refer to the *Downframing to the CM9760-MXBL* section.

## SIDEFRAMING

If more than 256 video inputs are required, multiple matrix bays must be installed in a sideframe configuration. Sideframing allows the video outputs of a bay to be connected to the video inputs of another bay to which the video output devices (for example, monitors, VCRs, and so on) are connected. The bay to which the video output devices are connected is referred to as the output bay. A maximum of eight matrix bays can be sideframed and connected to an output bay.

As viewed from the rear of the matrix bays, Figure 56 illustrates one bay sideframed to an output bay for a total of up to 496 video inputs and 16 video outputs.



**Figure 56.** CM9760-MXB Sideframing Example: 496 Video Inputs and 16 Video Outputs (496 x 16)



Note the following:

- In an initial system installation, multiple matrix bays are labeled to identify the location of the sideframed bays in the installation, for example, 2A, 12A, 22A, and so on. Figure 56 illustrates a two-bay configuration in which bay 12A (output bay) is sideframed to bay 2A (bay 1). For additional examples of sideframe configurations, refer to *Appendix B*.
- Video outputs of a bay connect to the video inputs in the output bay by means of BNC coaxial cables. Each coaxial cable connection from one bay sideframed to the output bay is referred to as a tie line. Alternatively, as shown in Figure 56, a coaxial ribbon cable can be used in a two-bay sideframed configuration to connect the 16-pin connector on the bottom of the CM9760-RPM card to the 16-pin connector on the bottom of the CM9760-RPC card.
- Any video input connector not used in the output bay to receive output from sideframed bays can be used for additional video inputs.
- If you add one or more matrix bays to an existing installation by sideframing, you can avoid the need to reprogram the existing bay(s) by adhering to the following guidelines:
  - If you add one matrix bay, install and configure the new bay as the output bay.
  - If you add more than one matrix bay, install and configure the last bay as the output bay.

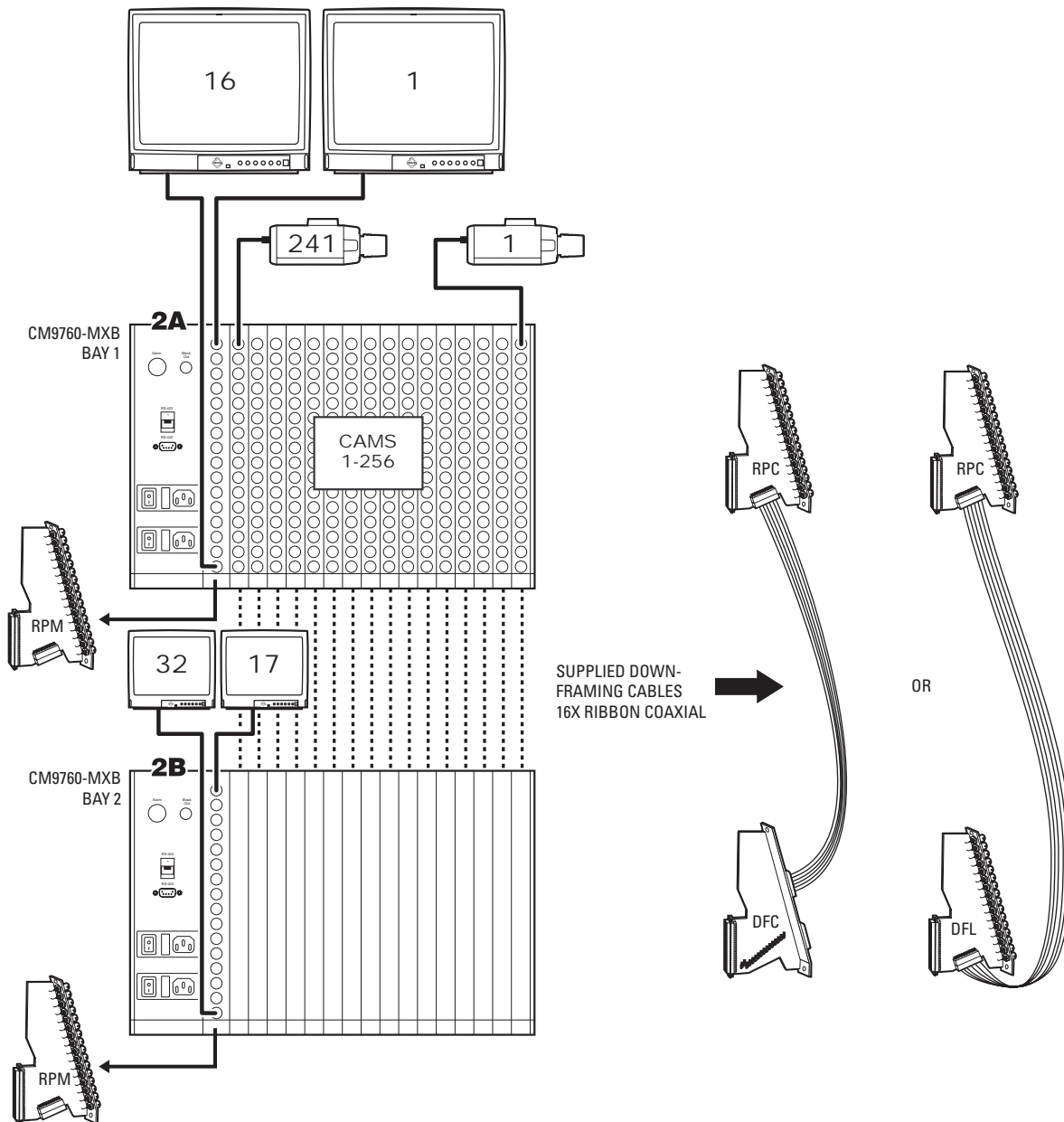
For example, to add a second matrix bay to an existing installation that contains only one bay, do the following. Decouple the monitors connected to the video output card in the existing bay. If possible, leave the cables connected to the output card. Connect the cables to the first 16 video inputs of the new bay. Connect the monitors to the video outputs of the new bay. The new bay then becomes the output bay.

If you wish to add a third bay to an existing two-bay installation, decouple the monitors of the existing output bay (second bay). If possible, leave the cables connected to the output card. Connect the cables to the second 16 video inputs of the new bay. The new bay then becomes the output bay (third bay). Then, detach the monitor output cables of the original bay from the first 16 inputs of the second bay and connect them to the first 16 inputs of the new bay.

## DOWNFRAMING

If more than 16 video outputs are required, multiple matrix bays must be installed in a downframe configuration. Downframing allows the video inputs of one bay to be connected to the video inputs of one or more additional bays, providing an additional 16 video outputs for each additional bay that is downframed. The inputs in the first bay become available to the downframed bays and any video input can be switched to the additional 16 monitor outputs provided in each downframed bay. A maximum of eight matrix bays can be connected in a downframe configuration, providing a maximum of 128 video outputs.

As viewed from the rear of the matrix bays, Figure 57 illustrates a sample downframe configuration containing a total of 256 video inputs and 32 video outputs. The downframe configuration illustrates downframing to one bay.



**Figure 57.** CM9760-MXB Downframing Example: 256 Video Inputs and 32 Video Outputs (256 x 32)

Note the following:

- In a new system installation, multiple matrix bays are labeled to identify the location of the downframed bays in the installation, for example, 2A, 2B, 2C, and so on. Figure 57 illustrates a two-bay configuration in which bay 2A (bay 1) is downframed to bay 2B (bay 2). For additional examples of downframe configurations, refer to *Appendix B*.
- Downframe cables are coaxial ribbon cables used to connect bays in a downframe configuration. A downframe cable is supplied with the CM9760-DFC and CM9760-DFL cards.

If you wish to add one or more matrix bays to an existing installation in a downframe configuration, note the following:

- If you downframe to only one bay, adhere to the following guidelines:
  - Termination jumpers on the CM9760-RPC cards in the first bay must be set in the unterminated position.
  - The downframed bay (second bay) can be populated with either CM9760-DFC or CM9760-DFL cards. If CM9760-DFC cards are used, termination jumpers must be set in the terminated position because the cards are in the last bay. If CM9760-DFL cards are used, termination jumpers must be set in the unterminated position only when looping to another device is required (termination must occur at the final device). When looping is not required, termination jumpers on the CM9760-DFL cards must be set in the terminated position.
- If you downframe to more than one bay, adhere to the following guidelines:
  - Termination jumpers on the CM9760-RPC cards in the first bay must be set in the unterminated position.
  - Each bay between the first and the last bay must be populated with CM9760-DFC cards. Termination jumpers on the CM9760-DFC cards must be set in the unterminated position.
  - The last bay can be populated with either CM9760-DFC or CM9760-DFL rear panel cards. If CM9760-DFC cards are used, termination jumpers must be set in the terminated position because the cards are in the last bay. If CM9760-DFL cards are used, termination jumpers must be set in the unterminated position only when looping to another device is required (termination must occur at the final device). When looping is not required, termination jumpers on the CM9760-DFL cards must be set in the terminated position.

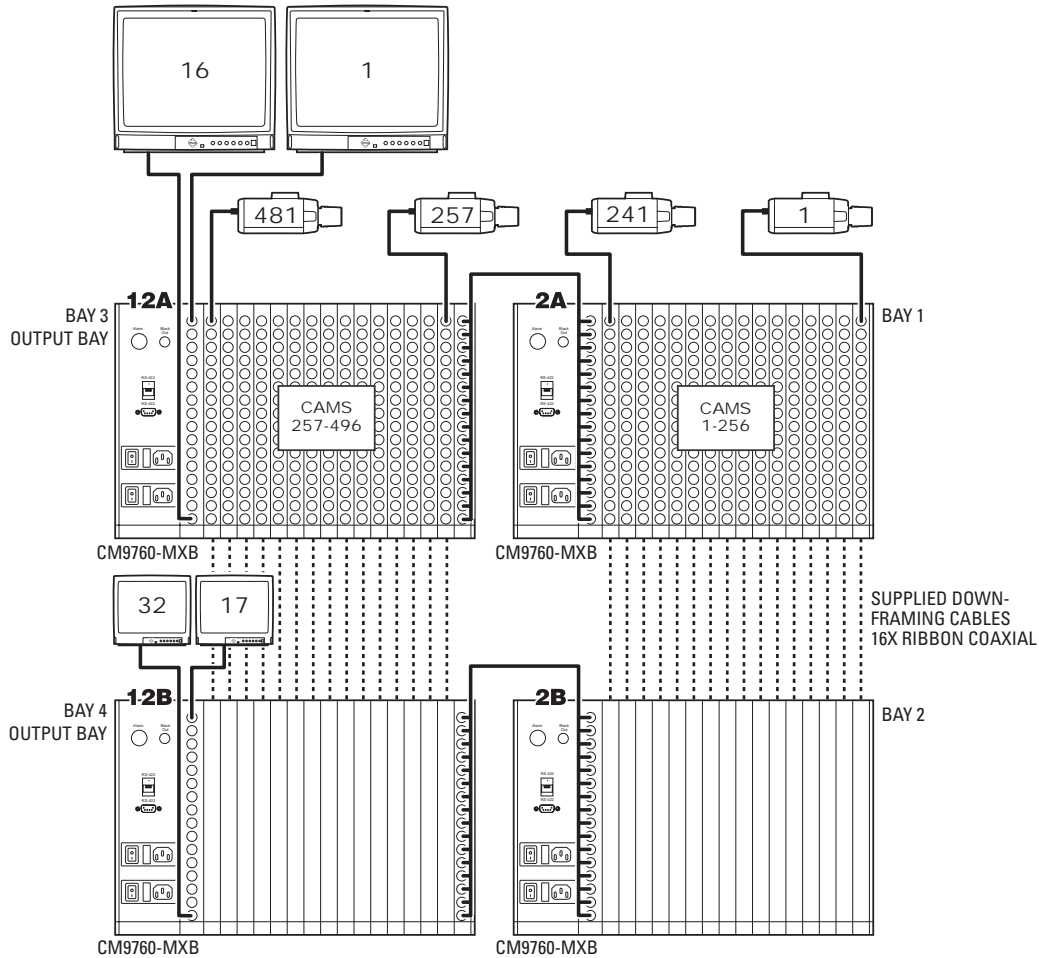
For detailed information about the CM9760-RPC, CM9760-DFC, and CM9760-DFL cards, refer to the *CM9760-RPC Rear Panel Input Card*, *CM9760-DFC Rear Panel Downframe Card*, and *CM9760-DFL Rear Panel Downframe Looping Card* sections, respectively.

## USING A COMBINATION OF SIDEFRAMING AND DOWNFRAMING

When expanding video inputs beyond 256 and video outputs beyond 16, a combination of sideframing and downframing must be used. Sideframing allows video inputs to be expanded beyond 256. Downframing allows video outputs to be expanded beyond 16. The maximum capacity of a single-node system is 2,048 video inputs and 128 video outputs.

**NOTE:** When using CM9760-MDA units, you can increase the video output capacity to a maximum of 512.

As viewed from the rear of the matrix bays, Figure 58 illustrates a matrix bay configuration containing sideframed and downframed bays that provide 496 video inputs and 32 video outputs. The configuration consists of a total of four matrix bays.



**Figure 58.** CM9760-MXB Sideframing and Downframing Example: 496 Video Inputs and 32 Video Outputs (496 x 32)

In a new system installation, multiple matrix bays are labeled to identify the location of sideframed and downframed bays in the installation, for example, labels 2A, 12A, 22A, and so on for sideframed bays and labels 2A, 2B, 2C, and so on for downframed bays. Figure 58 illustrates a four-bay configuration using a combination of sideframing and downframing:

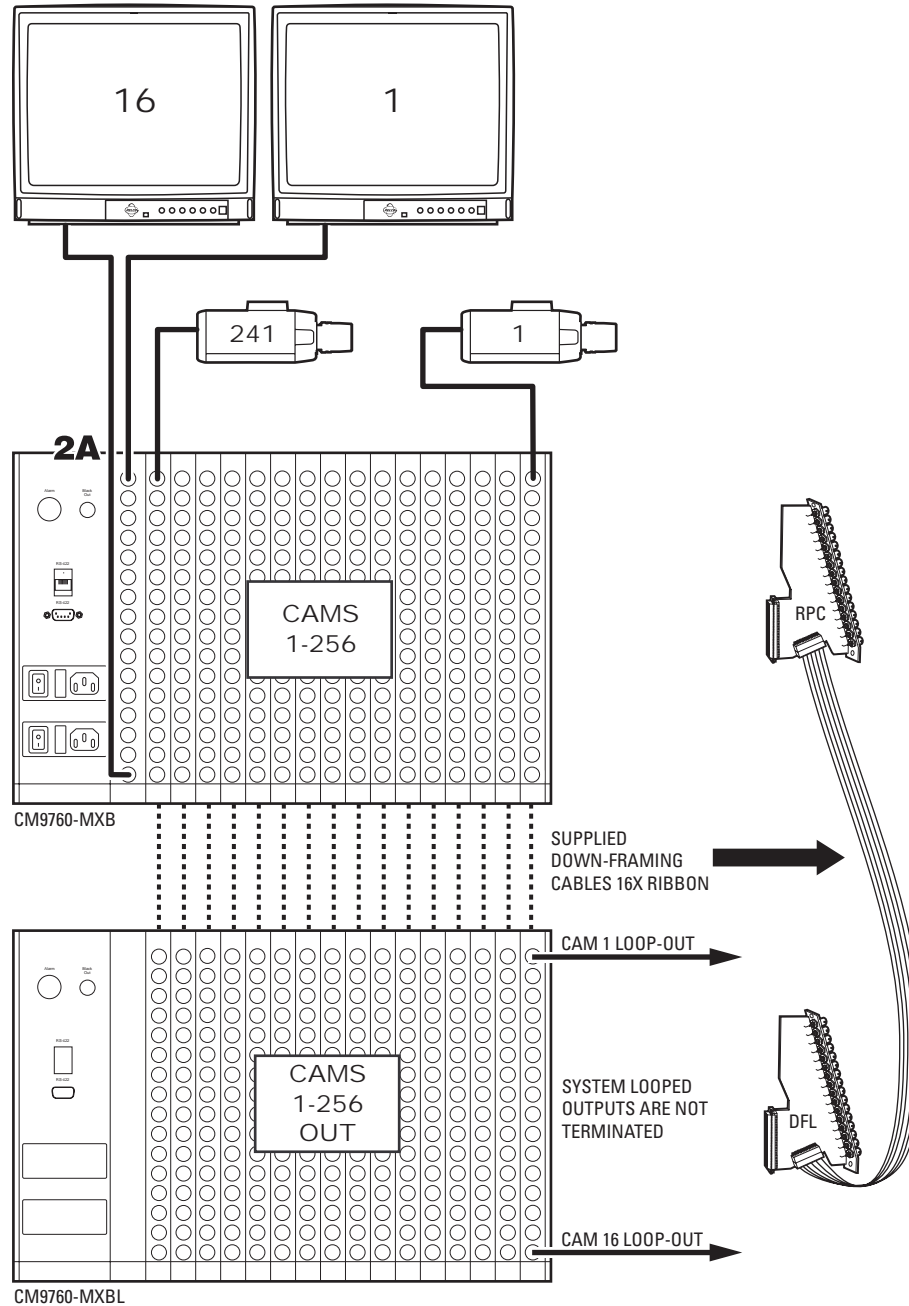
- Bay 12A is sideframed to bay 2A, increasing the number of available inputs from 256 to 496. Bay 12B is sideframed to bay 2B.
- Bay 2A is downframed to bay 2B. Bay 12A is downframed to bay 12B, increasing the number of available outputs from 16 to 32.

For additional examples of configurations using a combination of sideframing and downframing, refer to *Appendix B*.

## DOWNFRAMING TO THE CM9760-MXBL

When more than 128 video inputs and a maximum of 16 video outputs are required in a system that also requires looping, the CM9760-MXBL must be used to loop out the video. The CM9760-MXBL is a downframed matrix bay that does not require power. The CM9760-MXBL accommodates up to sixteen CM9760-DFL cards to loop out video. Note that front panel video input and output cards are not used in the CM9760-MXBL.

Figure 59 illustrates a sample CM9760-MXBL downframe configuration containing a total of 256 video inputs and 16 video outputs.



**Figure 59.** Downframing to CM9760-MXBL Example: 256 Video Inputs and 16 Video Outputs (256 x 16)

For additional examples of CM9760-MXBL downframe configurations, refer to *Appendix B*.

# Specifications

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## CM9700-CC1 SPECIFICATIONS

### ELECTRICAL

Input Voltage	120 VAC, 60 Hz or 230 VAC, 50 Hz, autoranging
Power Consumption	57 watts
Processor	Pentium® class CPU
Clock Speed	733 MHz
Memory	64 MB RAM
Disk Drive	3.5-inch, 1.44 MB
Flash Disk Storage	32 MB solid-state flash memory
Diagnostic Monitor Output	One VGA
I/O Ports	Sixteen RS-422 ports (expandable to 32); total system capacity is 120 ports Two RS-232 ports (COM 1 and COM 2) One parallel printer port (reserved for future use) One VGA output port Two PC AT-compatible keyboard ports (one front, one rear)

### GENERAL

Operating Temperature	32° to 120°F (0° to 49°C)
Dimensions	7.0 (H) x 19.0 (W) x 19.5 (D) inches (17.78 x 48.26 x 49.53 cm)
Mounting	Fits 19-inch EIA-standard rack (4 RUs)
Unit Weight	29.7 lb (13.5 kg)

## CM9760-MXB SPECIFICATIONS

### ELECTRICAL

Input Voltage	120 VAC, 60 Hz or 230 VAC, 50 Hz
Power Consumption	90 watts maximum (fully populated)
Communication	Full duplex RS-422 using an RJ-45 connector

### VIDEO

Inputs	Sixteen input card slots for supporting 256 inputs per bay
Outputs	One output card slot for supporting 16 outputs per bay
Video Input Level	0.5 to 2 Vp-p, RS-170 composite video
Impedance	75 ohms terminating (looping versions available)
Crosstalk	-60 dB at 3.58 MHz

### GENERAL

Operating Temperature	14° to 122°F (-10° to 50°C)
Dimensions	10.5 (H) x 19.0 (W) x 20.0 (D) inches (26.67 x 48.26 x 50.80 cm)
Mounting	Fits 19-inch EIA-standard rack (6 RUs)
Unit Weight	21.9 lb (9.93 kg) 60.0 lb (27.22 kg), fully populated

*(Design and product specifications subject to change without notice.)*

# Appendix A. CM9700-CC1 ASCII Protocol Communication

The CM9700-CC1 provides support of ASCII communication. ASCII data ports, referred to as IDT ports on the CM9700-CC1, interface to ASCII communication devices (ACDs) such as access control systems.

**NOTE:** When operating in ASCII mode, the KBD200A and KBD300A keyboards can interface to an IDT port of the CM9700-CC1.

When an ACD sends ASCII commands through a CM9700-CC1 IDT port, the CM9700-CC1 executes the commands. Up to 96 ACDs can be connected to the CM9700-CC1 and be configured as IDT ports. IDT ports are configured using the CM9700-MGR.

**NOTE:** IDT ports eliminate the need for CM9760-DT/CM9760-DT4 devices, which are referred to as external DTs.

The ASCII protocol uses the ASCII character set to transmit and receive commands between an ACD and the CM9700-CC1. The commands are used to control pan and tilt mechanisms (fixed and variable speed), camera functions, auxiliary relays, alarms, multiplexers, VCRs, and system tasks such as macros.

An IDT port communicates in a standard asynchronous, byte-oriented protocol that includes 1 start bit; 8 data bits; odd, even, or no parity; and 1 stop bit.

This appendix provides information about the following:

- ACD to CM9700-CC1 connections
- ASCII protocol commands supported by the CM9700-CC1

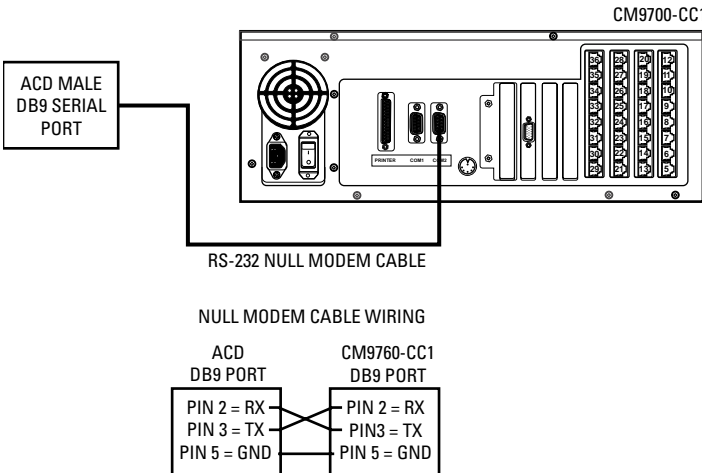
## ACD TO CM9700-CC1 CONNECTIONS

You can connect an ACD to the CM9700-CC1 in either of the following ways:

- ACD DB9 connection to CM9700-CC1 DB9 (COM 1 or COM 2) via RS-232 communication standard. Refer to the *Connecting an ACD DB9 Port to a CM9700-CC1 DB9 Port* section for wiring information.
- ACD DB9 (RS-232) connection to CM9700-CC1 RJ-45 (RS-422). In this case, the Pelco PV140 RS-232/RS-422 converter is used to provide a bidirectional electrical interface between the RS-232 port of the ACD and the RS-422 port of the CM9700-CC1. Refer to the *Connecting an ACD DB9 Port to a CM9700-CC1 RJ-45 Port* section for wiring information.

### CONNECTING AN ACD DB9 PORT TO A CM9700-CC1 DB9 PORT

Connect a DB9 port of the ACD to the DB9 COM 1 or COM 2 port of the CM9700-CC1 using a null modem cable. Refer to Figure 60 for wiring connections. In Figure 60, the ACD connects to the COM 2 port of the CM9700-CC1.

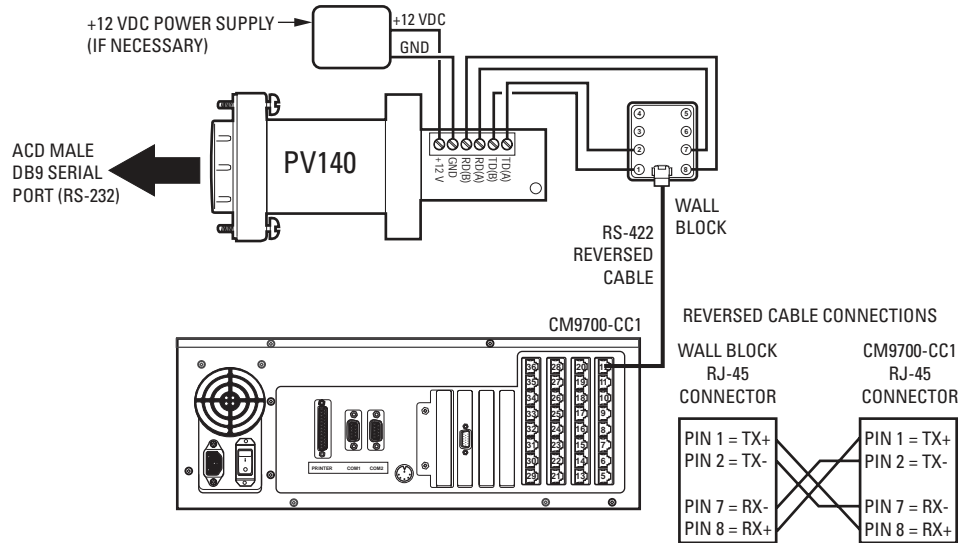


**Figure 60.** ACD DB9 to CM9700-CC1 DB9 Connection

## CONNECTING AN ACD DB9 PORT TO A CM9700-CC1 RJ-45 PORT

To connect an ACD DB9 port to a CM9700-CC1 RJ-45 port, refer to Figure 61 and do the following:

1. Connect the 9-pin side of the PV140 converter to a DB9 port of the ACD.
2. If necessary, connect the +12 VDC power supply to the PV140 converter; otherwise, proceed to step 3. (The power supply allows the PV140 converter to communicate serial port data over wire pairs for distances up to 4,000 feet [1,219 m] on the RS-422 side.)
  - a. Connect the black and white striped wire from the power supply to the +12 VDC terminal on the converter.
  - b. Connect the solid black wire from the power supply to the GND terminal on the converter.
3. Connect RD(B) on the converter to terminal 8 (RX+) on the wall block.
4. Connect RD(A) on the converter to terminal 7 (RX-) on the wall block.
5. Connect TD(B) on the converter to terminal 1 (TX+) on the wall block.
6. Connect TD(A) on the converter to terminal 2 (TX-) on the wall block.
7. Connect the wall block to an RJ-45 port of the CM9700-CC1 using an RJ-45 reversed cable.



**Figure 61.** ACD DB9 to CM9700-CC1 RJ-45 Connection

**NOTE:** The numbering of the screw terminals on the wall block shown in Figure 61 applies to the Pelco RJ-45 wall block. A wall block purchased from a supplier other than Pelco may have a different numbering scheme.



# ASCII PROTOCOL COMMANDS SUPPORTED BY THE CM9700-CC1

The ASCII protocol consists of a basic ASCII character set used to transmit and receive commands between an ASCII communication device (ACD) and the CM9700-CC1. Each command is identified by an ASCII character. Commands that require a numeric value must transmit the ASCII representation of that value in front of the command identifier. Most of the commands are terminated with the lowercase letter **a**. Multiplexer and VCR commands are terminated with the lowercase letter **m**.

The ASCII protocol also consists of an acknowledgement string that the CM9700-CC1 returns to the ACD. The acknowledgement may be a positive acknowledgement or a negative acknowledgement:

- A positive acknowledgement consists of the ASCII characters **AK** terminated with the lowercase letter **a** as follows: **AKa**
- A negative acknowledgement may be either of the following:
  - If a particular command sent by the ACD cannot be executed by the CM9700-CC1 and is rejected, the negative acknowledgement consists of the ASCII characters **NA** followed by the command being rejected and then terminated with the lowercase letter **a**.
  - If a particular command sent by the ACD is not recognized by the CM9700-CC1, the negative acknowledgement consists of the ASCII characters **NA** immediately terminated with the lowercase letter **a** as follows: **NAa**

Table O provides a summary listing of ASCII commands supported by the CM9700-CC1.

Table P provides descriptions of the ASCII commands.

Table Q provides examples of ASCII commands.

**Table 0.** ASCII Command Summary

Action	Command*	Action	Command*
Pan and Tilt Commands			
Pan Left Stop Pan Left	[1-64]La ~La	Tilt Up Stop Tilt Up	[1-63]Ua ~Ua
Pan Right Stop Pan Right	[1-64]Ra ~Ra	Tilt Down Stop Tilt Down	[1-63]Da ~Da
Stop All PTZ Motion	sa		
Camera Control Commands			
Focus Near Stop Focus Near	Na ~Na	Zoom Telephoto Stop Zoom Telephoto	Ta ~Ta
Focus Far Stop Focus Far	Fa ~Fa	Zoom Wide Stop Zoom Wide	Wa ~Wa
Iris Open Stop Iris Open	Oa ~Oa		
Iris Close Stop Iris Close	Ca ~Ca		
Advanced Commands			
Start Record Pattern Stop Record Pattern	[1-99]/a [1-99]/a	Set Preset without Label	[1-99]^a
Start Pattern Stop Pattern	[1-99]pa [1-99]na	Set Preset with Label	la[string]a[1-99]^a
Start Macro Stop Macro	[1-9999]Sa [1-9999]Ha	Go to Preset Position	[1-99]\a
Start a Sequence End a Sequence	[1-9999]qa [1-9999]ea	Camera Auxiliary ON Camera Auxiliary OFF	[1-8]Aa [1-8]Ba
Begin a Tour End a Tour	[1-9999]ta [1-9999]ra	GPI Auxiliary ON GPI Auxiliary OFF	[9-20008]Aa [9-20008]Ba or [9-20008]~Aa
Trigger Alarm Clear/Reset Alarm	[1-9999]Ea [1-9999]Ia	Query Device	Qa
Next Alarm	ia	Video Loss Detect	[cam #]Va
Previous Alarm	da	Set Date and Time	ZaMM/DD/YY/HH:MM:SSa
Report Revision	va		

**Table 0.** ASCII Command Summary (Continued)

Action	Command*	Action	Command*
Matrix Control Commands			
Select Monitor	[1-9999]Ma	Lock Camera to Monitor Unlock Camera from Monitor	Ga ~Ga
Select Camera	[1-999999]#a	Override Camera-to-Monitor Lock	oa
Next Camera	+a		
Previous Camera	−a		
Multiplexer Commands			
Digital Zoom	ym	Scene Movement Using Joystick or Cursor Keys: Left, Stop Left Right, Stop Right Up, Stop Up Down, Stop Down	dLm, ~dLm dRm, ~dRm dUm, ~dUm dDm, ~dDm
Picture-in-Picture	im		
Quad	um		
Nano	om		
Hex	xm		
Select Multiplexer Input	[1-16]#m		
VCR Commands			
Eject tape	<m	Rewind tape	<<m
Record tape	rm	Stop tape	sm
Pause tape	em	Play tape	>m
Fast Forward tape	>>m		
*Commands that include numeric ranges are enclosed in brackets. The brackets are not part of the commands; therefore, omit the brackets when entering the commands.			

**Table P. ASCII Command Descriptions**

Action	Command*	Command Description
<b>Pan and Tilt Commands</b>		
Pan Left	[1-64]La	Moves the currently selected pan and tilt device to the left at the speed indicated. The speed ranges from 1-64: 1 is the slowest speed and 64 activates Turbo mode. Note the following: <ul style="list-style-type: none"> <li>• If the speed is omitted, some devices move at their default speed and other devices move at their slowest speed.</li> <li>• The speed has no effect on fixed-speed devices; therefore, omit the speed when controlling a fixed-speed device.</li> </ul>
Stop Pan Left	~La	Stops left panning of the currently selected pan and tilt device.
Pan Right	[1-64]Ra	Moves the currently selected pan and tilt device to the right at the speed indicated. The speed ranges from 1-64: 1 is the slowest speed and 64 activates Turbo mode. Note the following: <ul style="list-style-type: none"> <li>• If the speed is omitted, some devices move at their default speed and other devices move at their slowest speed.</li> <li>• The speed has no effect on fixed-speed devices; therefore, the speed should be omitted when controlling a fixed-speed device.</li> </ul>
Stop Pan Right	~Ra	Stops right panning of the currently selected pan and tilt device.
Tilt Up	[1-63]Ua	Moves the currently selected pan and tilt device up at the speed indicated. The speed ranges from 1-63: 1 is the slowest speed and 63 is the fastest speed. Note the following: <ul style="list-style-type: none"> <li>• If the speed is omitted, some devices move at their default speed and other devices move at their slowest speed.</li> <li>• The speed has no effect on fixed-speed devices; therefore, the speed should be omitted when controlling a fixed-speed device.</li> </ul>
Stop Tilt Up	~Ua	Stops the upward tilt of the currently selected pan and tilt device.
Tilt Down	[1-63]Da	Moves the currently selected pan and tilt device down at the speed indicated. The speed ranges from 1-63: 1 is the slowest speed and 63 is the fastest speed. Note the following: <ul style="list-style-type: none"> <li>• If the speed is omitted, some devices move at their default speed and other devices move at their slowest speed.</li> <li>• The speed has no effect on fixed-speed devices; therefore, the speed should be omitted when controlling a fixed-speed device.</li> </ul>
Stop Tilt Down	~Da	Stops the downward tilt of the currently selected pan and tilt device.
Stop All PTZ Motion	sa	Stops all image motion, that is, stops pan, tilt, zoom, focus, and iris operations.

**Table P. ASCII Command Descriptions (Continued)**

Action	Command*	Command Description
<b>Camera Control Commands</b>		
Focus Near	Na	Causes the currently selected camera to adjust the focus range nearer to the camera.
Stop Focus Near	~Na	Stops the focusing of the currently selected camera.
Focus Far	Fa	Causes the currently selected camera to adjust the focus range farther from the camera.
Stop Focus Far	~Fa	Stops the focusing of the currently selected camera.
Iris Open	Oa	Opens the iris of the currently selected camera and brightens the image.
Stop Iris Open	~Oa	Stops opening the iris of the currently selected camera.
Iris Close	Ca	Closes the iris of the currently selected camera and darkens the image.
Stop Iris Close	~Ca	Stops closing the iris of the currently selected camera.
Zoom Telephoto	Ta	Narrows the field of view of the currently selected camera and makes objects appear larger (zooms in).
Stop Zoom Telephoto	~Ta	Stops the currently selected camera from zooming in.
Zoom Wide	Wa	Widens the field of view of the currently selected camera and makes objects appear smaller (zooms out).
Stop Zoom Wide	~Wa	Stops the currently selected camera from zooming out.
<b>Advanced Commands</b>		
Start Record Pattern	[1-99]/a	On receivers that do patterns, the Start Record Pattern command allows recording of a user-defined pattern. A value ranging from 1 to 99 equals the pattern number. (Consult the receiver manual for specific information regarding implementation.)
Stop Record Pattern	[1-99]/a	Stops the recording of a pattern. <b>NOTE:</b> The Start Record Pattern command functions as a toggle. Issuing the [1-99]/a command starts the recording of a pattern. Issuing the command a second time stops recording the pattern. <b>NOTE:</b> In some instances, entering the pattern number as part of the command is optional. For example, Spectra II™ and the ES3000 Series Esprit™ units are capable of recording one full pattern or two half-patterns. Issuing the /a command starts full-pattern recording. Issuing the /a command again stops full-pattern recording. Half-pattern programming follows the same sequence, except that the pattern number must be included in the command to start and stop pattern recording.
Start Pattern	[1-99]pa	Starts the pattern. A value ranging from 1 to 99 equals the pattern number. (Consult the receiver manual for specific information regarding implementation.)
Stop Pattern	[1-99]na	Stops the pattern.

**Table P. ASCII Command Descriptions (Continued)**

Action	Command*	Command Description
<b>Advanced Commands (Continued)</b>		
Start Macro	[1-9999]Sa	Starts the selected macro. A value ranging from 1 to 9999 equals the logical macro number.
Stop Macro	[1-9999]Ha	Stops the selected macro.
Start a Sequence	[1-9999]qa	Performs the same operation as the Start Macro command, that is, starts the selected macro. A value ranging from 1 to 9999 equals the logical macro number.
End a Sequence	[1-9999]ea	Performs the same operation as the Stop Macro command, that is, stops the selected macro.
Begin a Tour	[1-9999]ta	Performs the same operation as the Start Macro command, that is, starts the selected macro. A value ranging from 1 to 9999 equals the logical macro number.
End a Tour	[1-9999]ra	Performs the same operation as the Stop Macro command, that is, stops the selected macro.
Trigger Alarm	[1-9999]Ea	Generates an alarm. A value ranging from 1 to 9999 equals the physical alarm number.
Acknowledge Alarm	[1-9999]Ia	Acknowledges an alarm. A value ranging from 1 to 9999 equals the logical alarm number. <b>NOTE:</b> The effects of the Trigger Alarm and Acknowledge Alarm commands are system dependent.
Next Alarm	ia	Requests the next alarm in the active alarm list. If there are no active alarms, the data translator returns the ia command to the ACD as a response. If there is at least one active alarm, the data translator sends the following response to the ACD: XXXXia XXXX is a one-to-four-digit logical alarm number.
Previous Alarm	da	Requests the previous alarm in the active alarm list. If there are no active alarms, the data translator returns the da command to the ACD as a response. If there is at least one active alarm, the data translator sends the following response to the ACD: XXXXda XXXX is a one-to-four-digit logical alarm number.
Set Preset without Label	[1-99]^a	Sets a preset camera position without an embedded label. A value ranging from 1 to 99 equals the preset camera position.
Set Preset with Label	la[string]a[1-99]^a	Sets a preset camera position with an embedded label, where: <ul style="list-style-type: none"> <li><b>string</b> is an alphanumeric label of up to 20 ASCII characters that must be uppercase.</li> <li>A value ranging from 1 to 99 equals the preset camera position.</li> </ul> <b>Example:</b> To set preset 1 with the label <b>FRONT DOOR</b> , the command is as follows: laFRONT DOORa1^a
Go to Preset Position	[1-99]a	Recalls a stored preset position.
Camera Auxiliary ON	[1-8]Aa	Turns on the designated auxiliary (relay output) at the camera. A value ranging from 1 to 8 equals the camera auxiliary number.
Camera Auxiliary OFF	[1-8]Ba	Turns off the camera auxiliary.

**Table P. ASCII Command Descriptions (Continued)**

Action	Command*	Command Description
<b>Advanced Commands (Continued)</b>		
GPI Auxiliary ON	[9-20008]Aa	Turns on the designated auxiliary (relay output) at the General Purpose Interface (GPI). A value ranging from 9-20008 equals the GPI auxiliary number.
GPI Auxiliary OFF	[9-20008]Ba or [9-20008]~Aa	Turns off the GPI auxiliary.
Query Device	Qa	Polls a device to give it an opportunity to transmit pending information to the system master or to take control of the bus for a limited time.
Video Loss Detect	[cam #]Va	Reports a video loss condition from the specified camera in response to a Query command from the system master.
Set Date and Time	ZaMM/DD/YY/HH:MM:SSa	Sets the date and time. Note the following: <ul style="list-style-type: none"> <li>• Because the time and date string can be confused with other commands, the command string <b>Za</b> comes first. Za puts the receiving device into a mode that can accept the specialized string.</li> <li>• MM equals two-digit month.</li> <li>• DD equals two-digit day.</li> <li>• YY equals two-digit year.</li> <li>• HH equals two-digit hour, ranging from 00 to 23 (military time).</li> <li>• MM equals two-digit minute, ranging from 00 to 59.</li> <li>• SS equals two-digit second, ranging from 00 to 59.</li> </ul>
Report Revision	va	Requests the version number of the device.
<b>Matrix Control Commands</b>		
Select Monitor	[1-9999]Ma	Calls a monitor to use for camera operation. A value ranging from 1 to 9999 equals the logical monitor number.
Select Camera	[1-999999]#a	Selects a camera to be displayed on the current monitor. A value ranging from 1 to 999999 equals the logical camera number.
Next Camera	+a	Advances to the next numbered camera in the system.
Previous Camera	~a	Goes back to the previous numbered camera in the system.
Lock Camera to Monitor	Ga	Locks the currently selected camera to the currently selected monitor. Users are not allowed to control the locked camera or to switch the locked camera from the locked monitor.
Unlock Camera from Monitor	~Ga	Unlocks the currently selected camera from the currently selected monitor. To unlock a camera, the command must be issued from the data translator that locked the camera.
Override Camera-to-Monitor Lock	oa	Overrides a camera-to-monitor lock that was issued by another user if the data translator is set as an equal or higher priority user than the user who locked the camera.

**Table P. ASCII Command Descriptions (Continued)**

Action	Command*	Command Description
<b>Multiplexer Commands</b>		
Digital Zoom	ym	Displays a full-screen view of the selected multiplexer input. Issuing the command again results in a 2X magnification and then again in a 4X magnification. You can toggle through all 16 screens one at a time by issuing the Select Multiplexer Input command ([1-16]#m) followed by the Digital Zoom (ym) command.
Picture-in-Picture	im	Displays picture-in-picture mode for the multiplexer input. You can cycle through all 16 multiplexer inputs by issuing the Select Multiplexer Input command for each input.
Quad	um	Displays a group of 4 of the available 16 multiplexer inputs. Reissuing the command displays the next 4 multiplexer inputs, and so on.
Nano	om	Displays a group of 9 of the available 16 multiplexer inputs: multiplexer inputs 1-9. Reissuing the command displays multiplexer inputs 8-16.
Hex	xm	Displays all 16 multiplexer inputs of the 16-channel multiplexer.
Select Multiplexer Input	[1-16]#m	Selects one multiplexer input to be displayed. A value ranging from 1 to 16 equals the number of the multiplexer input.
Scene Movement Using Joystick or Cursor Keys: Left, Stop Left Right, Stop Right Up, Stop Up Down, Stop Down	dLm, ~dLm dRm, ~dRm dUm, ~dUm dDm, ~dDm	Directs scene movement when monitor is operating in the Digital Zoom mode.
<b>VCR Commands</b>		
Eject Tape	<m	Ejects the tape currently installed.
Record Tape	rm	Starts recording on the tape currently installed.
Pause Tape	em	Pauses the tape currently playing.
Fast Forward Tape	>>m	Fast forwards the current tape.
Rewind Tape	<<m	Rewinds the current tape.
Stop Tape	sm	Stops the tape currently playing.
Play Tape	>m	Plays the tape currently installed.
*Commands that include numeric ranges are enclosed in brackets. The brackets are not part of the commands; therefore, omit the brackets when entering the commands.		



**Table Q.** ASCII Command Examples

<b>Action</b>	<b>Command</b>
Switch camera 3 to monitor 1.	1Ma3#a
Go to camera 2, preset 3 on monitor 5.	5Ma2#a3\a
Pan right at speed 47, tilt down at speed 33.	47Ra33Da
Stop tilt down only.	~Da
Run macro 10 on monitor 1.	1Ma10Sa
Stop macro 10 on monitor 1.	1Ma10Ha
Trigger alarm 945.	945Ea
Stop alarm 945.	945Ia

## Appendix B. CM9760-MXB Sideframe and Downframe Configuration Examples

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This appendix provides examples of the following types of CM9760-MXB configurations:

- Sideframe-only configurations:
  - 736 x 16 (refer to Figure 62)
  - 976 x 16 (refer to Figure 63)

**NOTE:** For an illustration of a 496 x 16 sideframe-only configuration, refer to *Sideframing* in the *CM9760-MXB Matrix Bay* section.

- Downframe-only configurations:
  - 256 x 48 (refer to Figure 64)
  - 256 x 48, looping (refer to Figure 65)
  - 256 x 64 (refer to Figure 66)
  - 256 x 64, looping (refer to Figure 67)

**NOTE:** For an illustration of a 256 x 32 downframe-only configuration, refer to *Downframing* in the *CM9760-MXB Matrix Bay* section.

- Combination of sideframe and downframe configurations:
  - 496 x 32, looping (refer to Figure 68)
  - 496 x 48 (refer to Figure 69)
  - 496 x 48, looping (refer to Figure 70)
  - 496 x 64 (refer to Figure 71)
  - 496 x 64, looping (refer to Figure 72)
  - 736 x 32 (refer to Figure 73)
  - 736 x 32, looping (refer to Figure 74)
  - 736 x 48 (refer to Figure 75)
  - 736 x 48, looping (refer to Figure 76)
  - 736 x 64 (refer to Figure 77)
  - 736 x 64, looping (refer to Figure 78)
  - 976 x 32 (refer to Figure 79)
  - 976 x 32, looping (refer to Figure 80)
  - 976 x 48 (refer to Figure 81)
  - 976 x 48, looping (refer to Figure 82)
  - 976 x 64 (refer to Figure 83)
  - 976 x 64, looping (refer to Figure 84)

**NOTE:** For an illustration of a 496 x 32 nonlooping configuration that uses a combination of downframing and sideframing, refer to *Using a Combination of Sideframing and Downframing* in the *CM9760-MXB Matrix Bay* section.

- CM9760-MXBL downframe configurations:
  - 496 x 16, looping (refer to Figure 85)
  - 736 x 16, looping (refer to Figure 86)
  - 976 x 16, looping (refer to Figure 87)

**NOTE:** For an illustration of a 256 x 16 configuration that downframes to the CM9760-MXBL, refer to *Downframing to the CM9760-MXBL* in the *CM9760-MXB Matrix Bay* section.

# SIDEFRADE-ONLY CONFIGURATION EXAMPLES

Figure 62 and Figure 63 illustrate sideframe-only configurations.

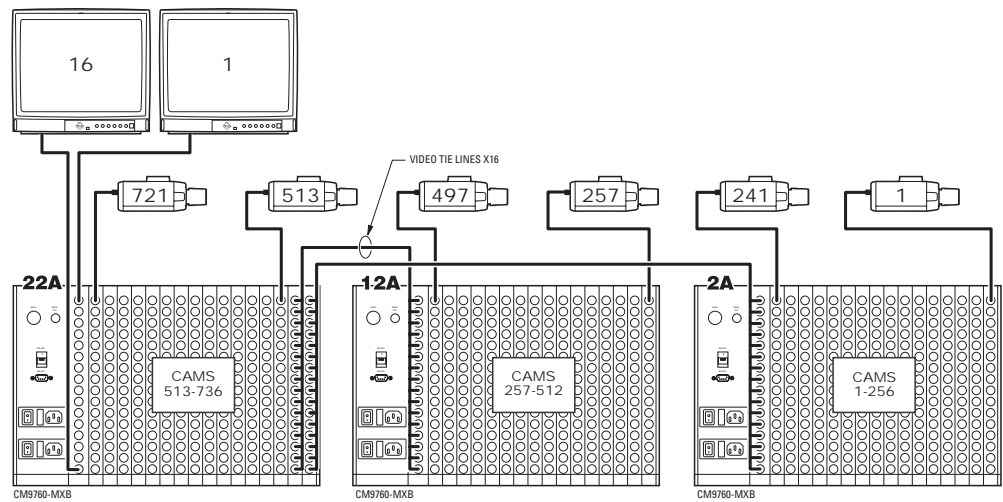


Figure 62. Sideframing: 736 x 16 Configuration

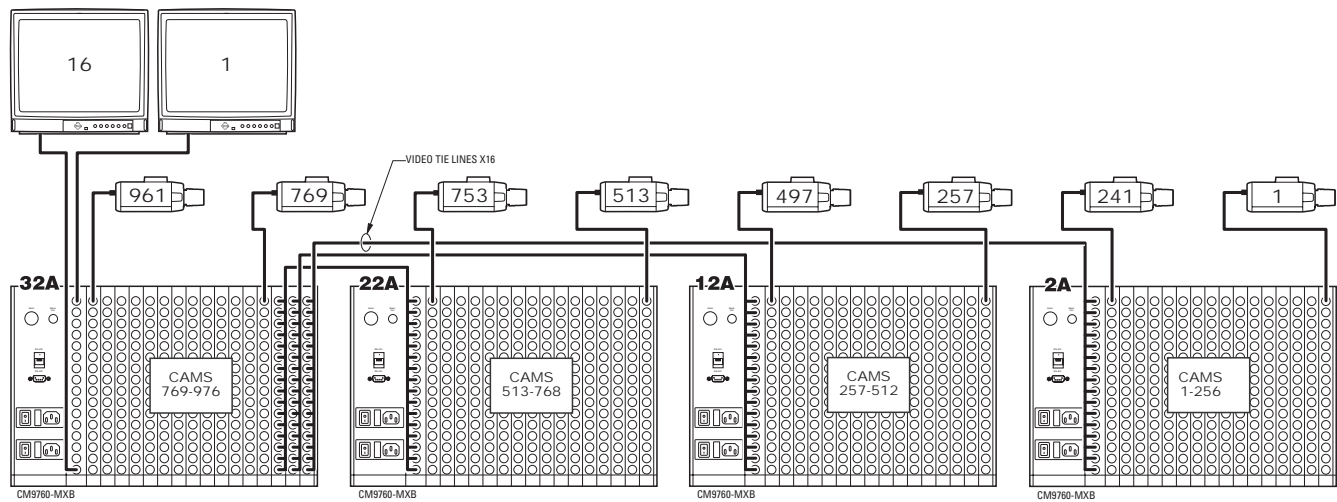
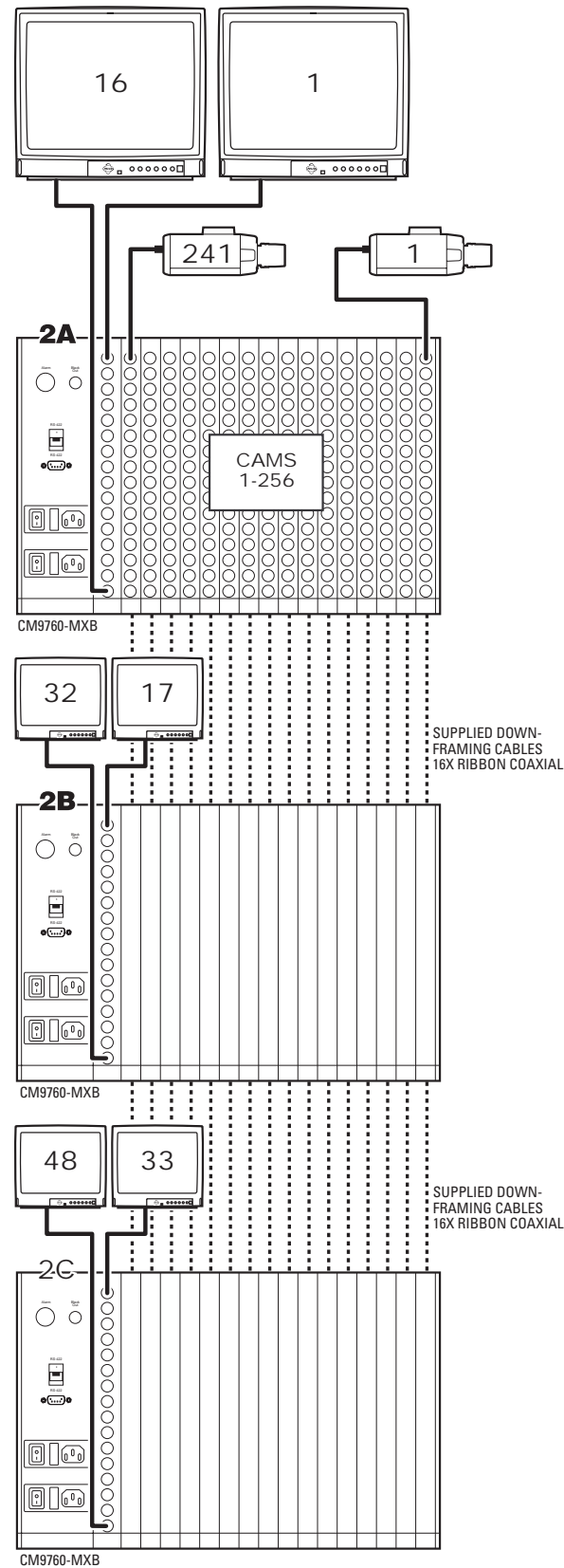


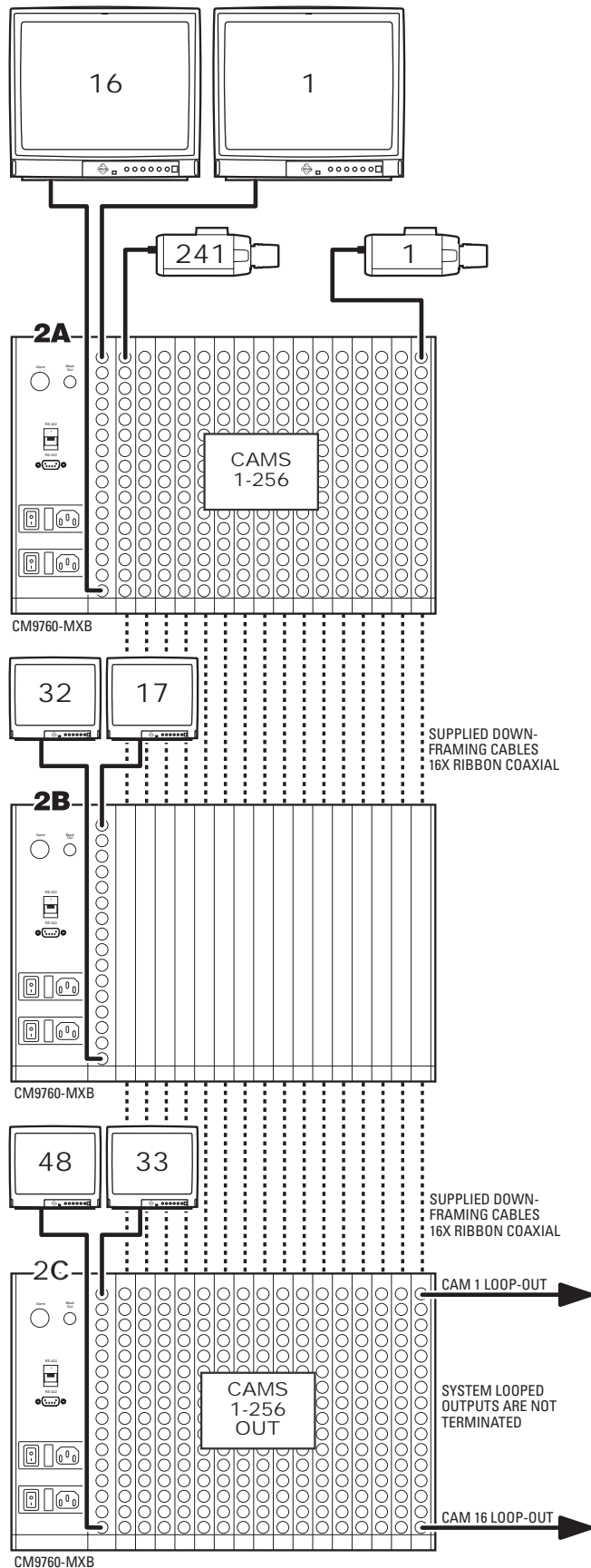
Figure 63. Sideframing: 976 x 16 Configuration

# DOWNFRAME-ONLY CONFIGURATION EXAMPLES

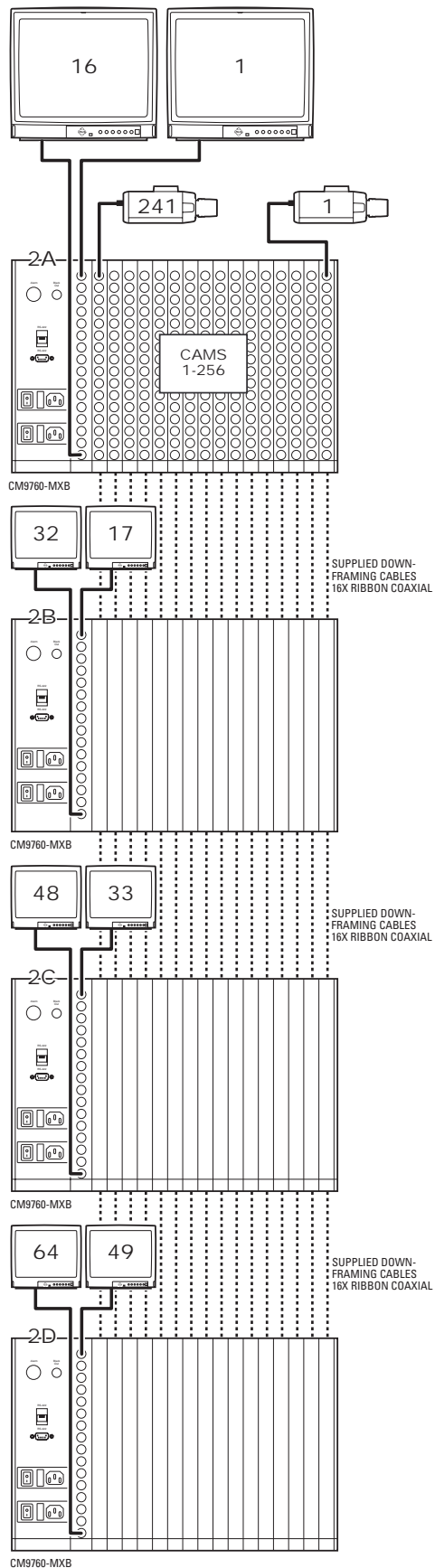
Figure 64 to Figure 67 illustrate downframe-only configurations.



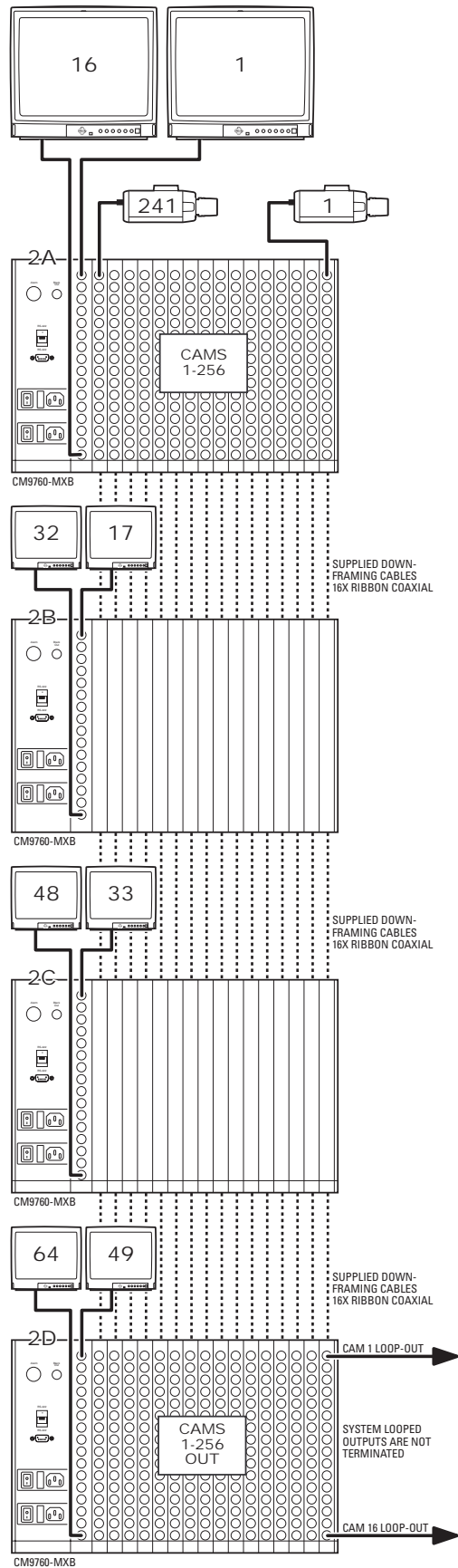
**Figure 64.** Downframing: 256 x 48 Configuration



**Figure 65.** Downframing: 256 x 48 Configuration, Looping



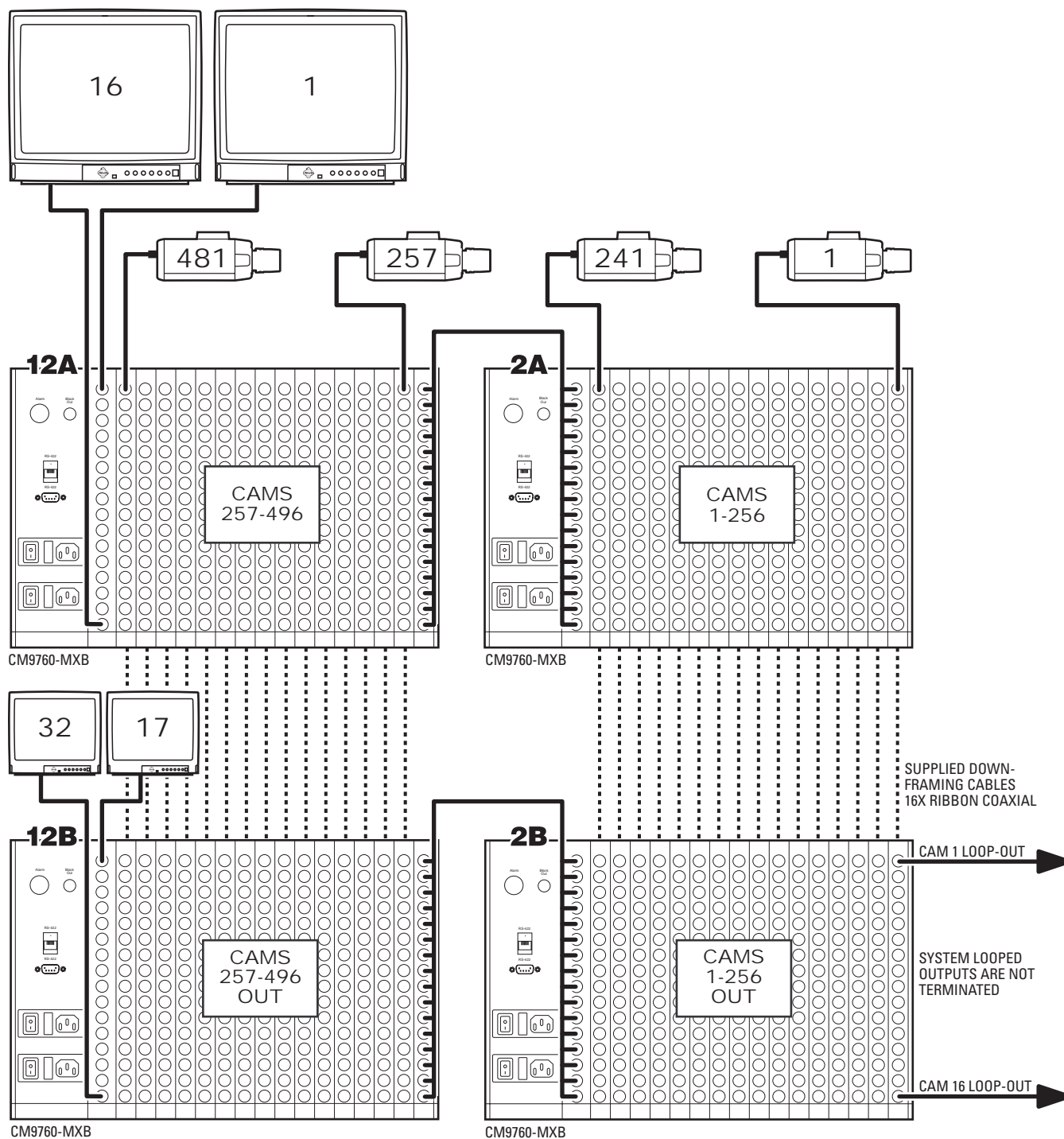
**Figure 66.** Downframing: 256 x 64 Configuration



**Figure 67.** Downframing: 256 x 64 Configuration, Looping

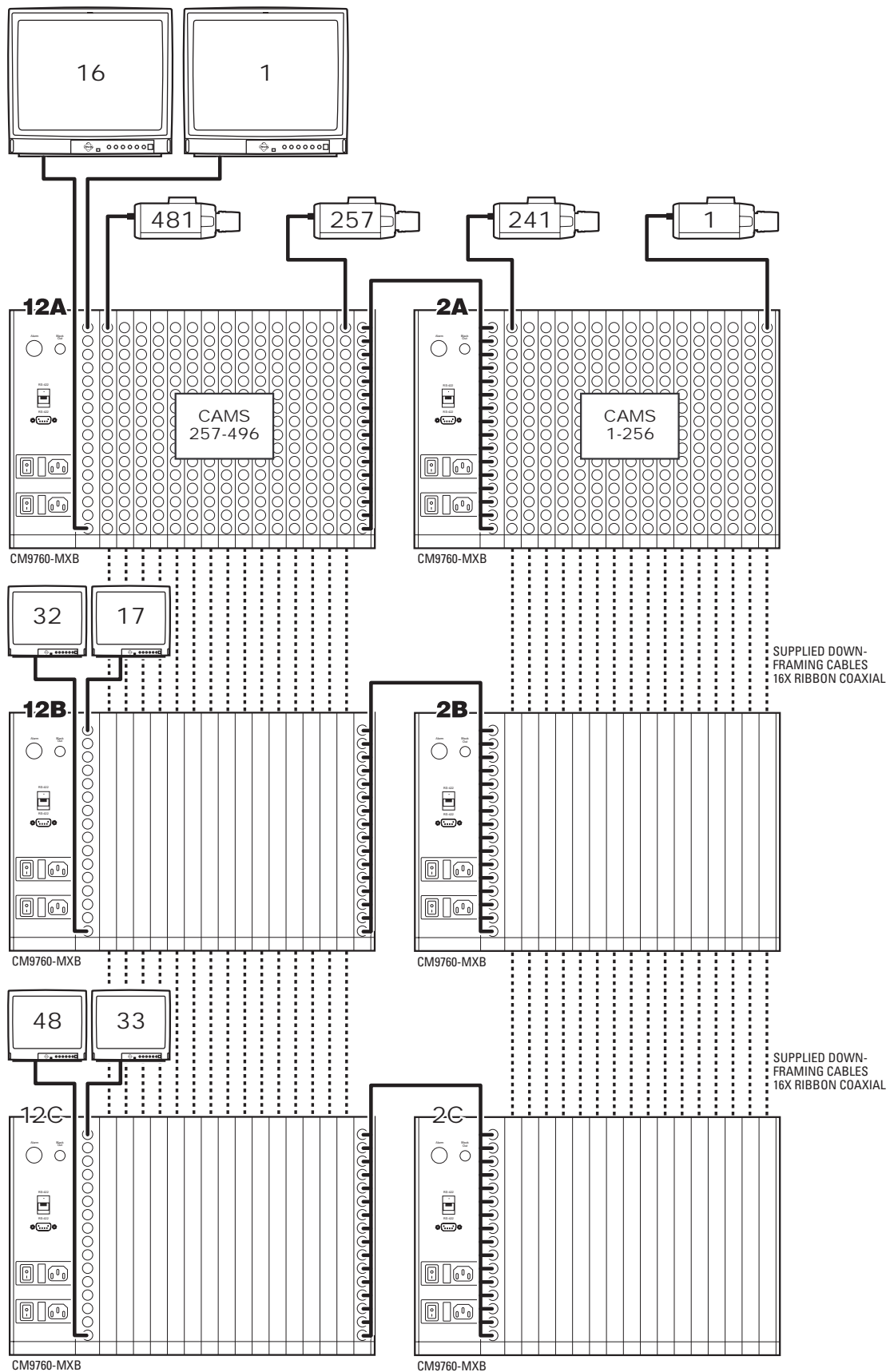
## SIDEFAME AND DOWNFRAME COMBINATION CONFIGURATION EXAMPLES

Figure 68 to Figure 84 illustrate configurations using a combination of sideframing and downframing.

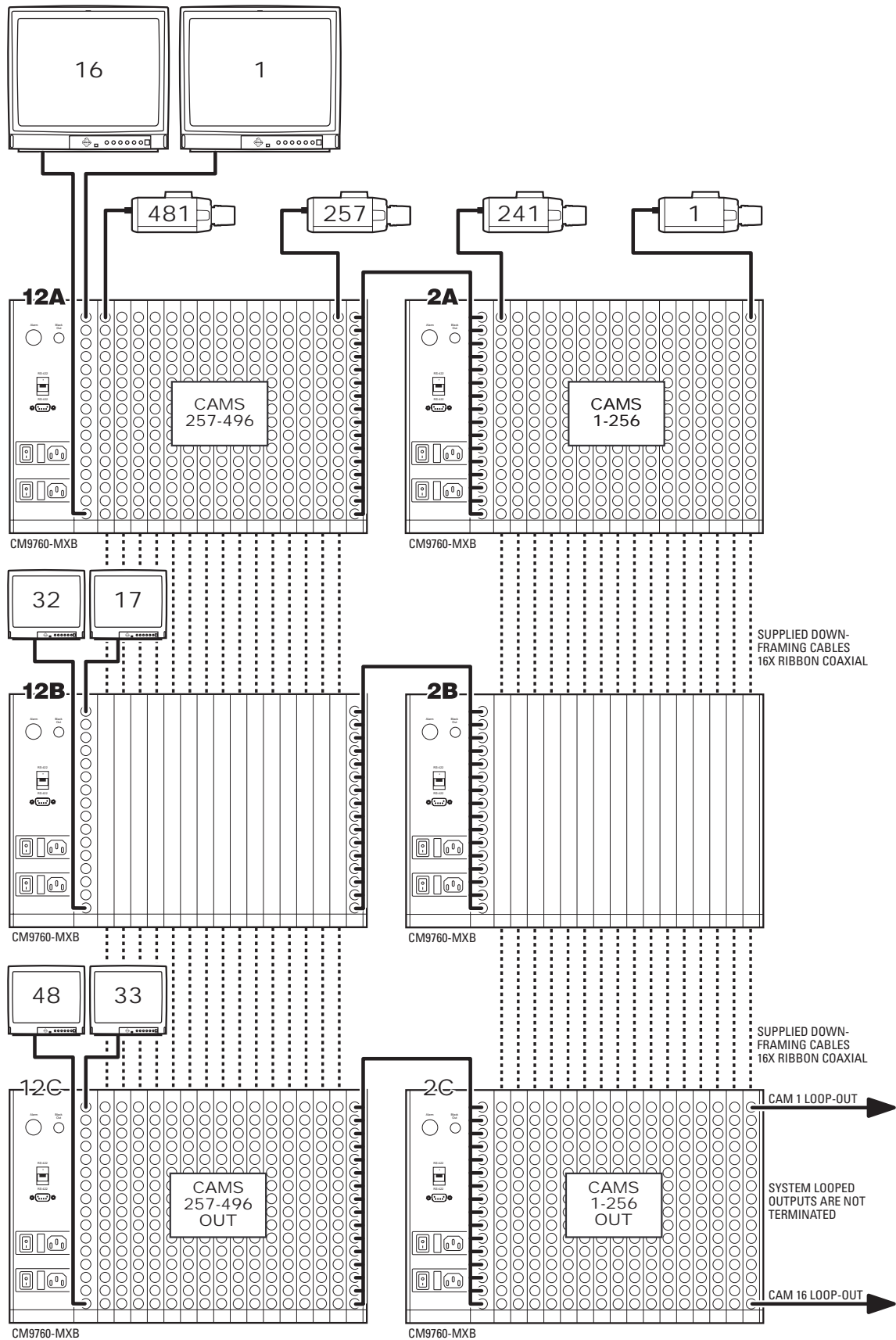


**Figure 68.** Sideframing and Downframing: 496 x 32 Configuration, Looping

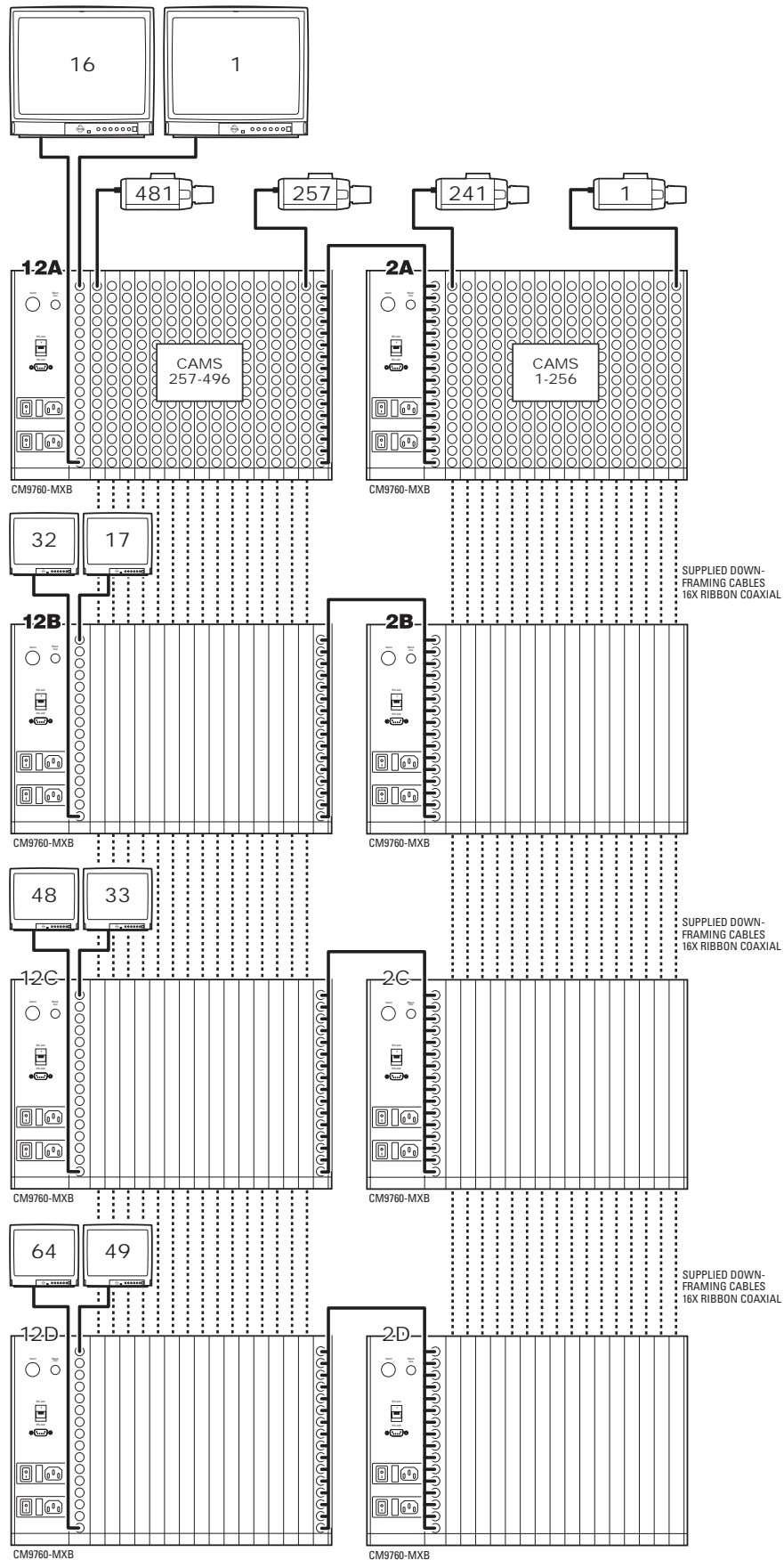




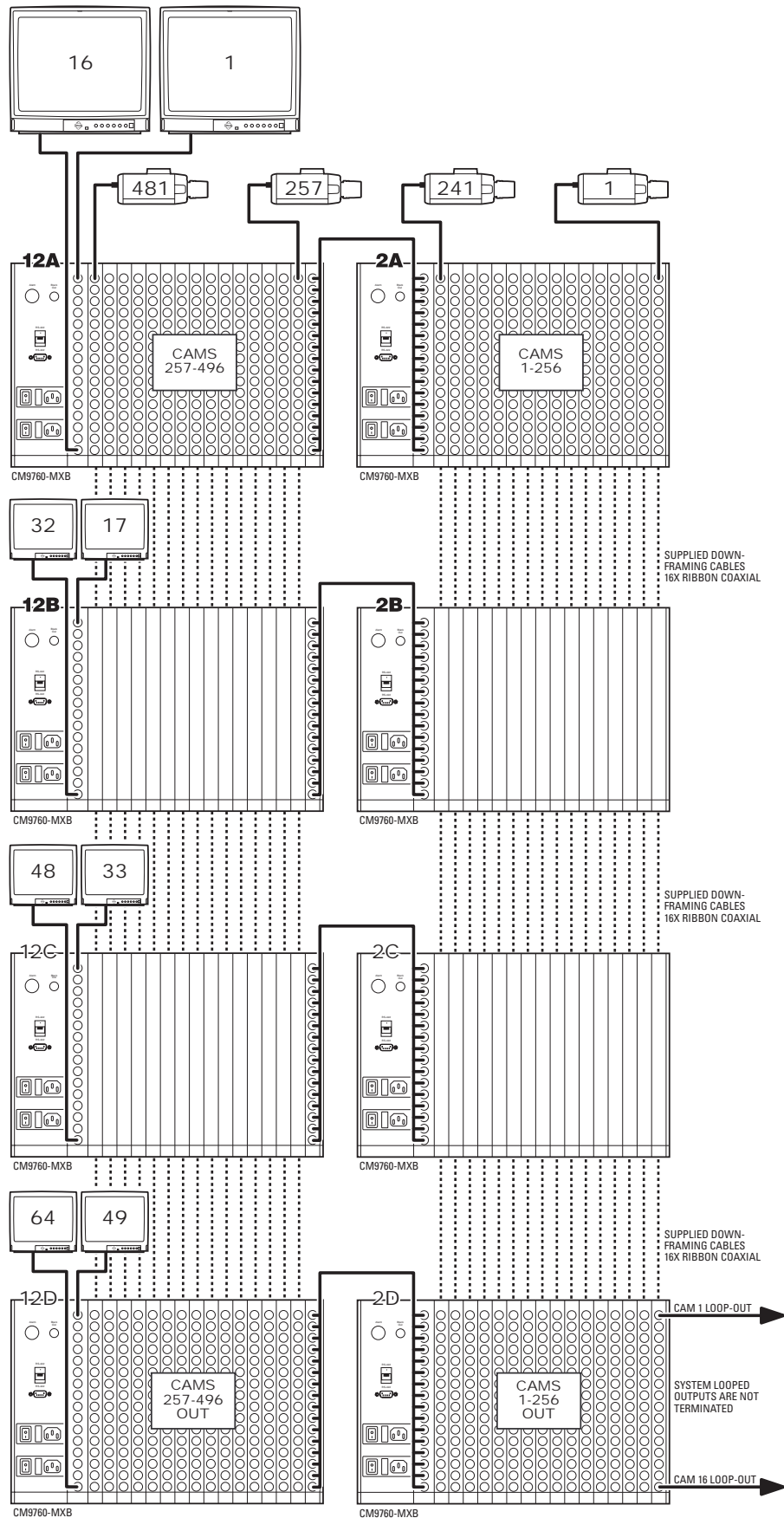
**Figure 69.** Sideframing and Downframing: 496 x 48 Configuration



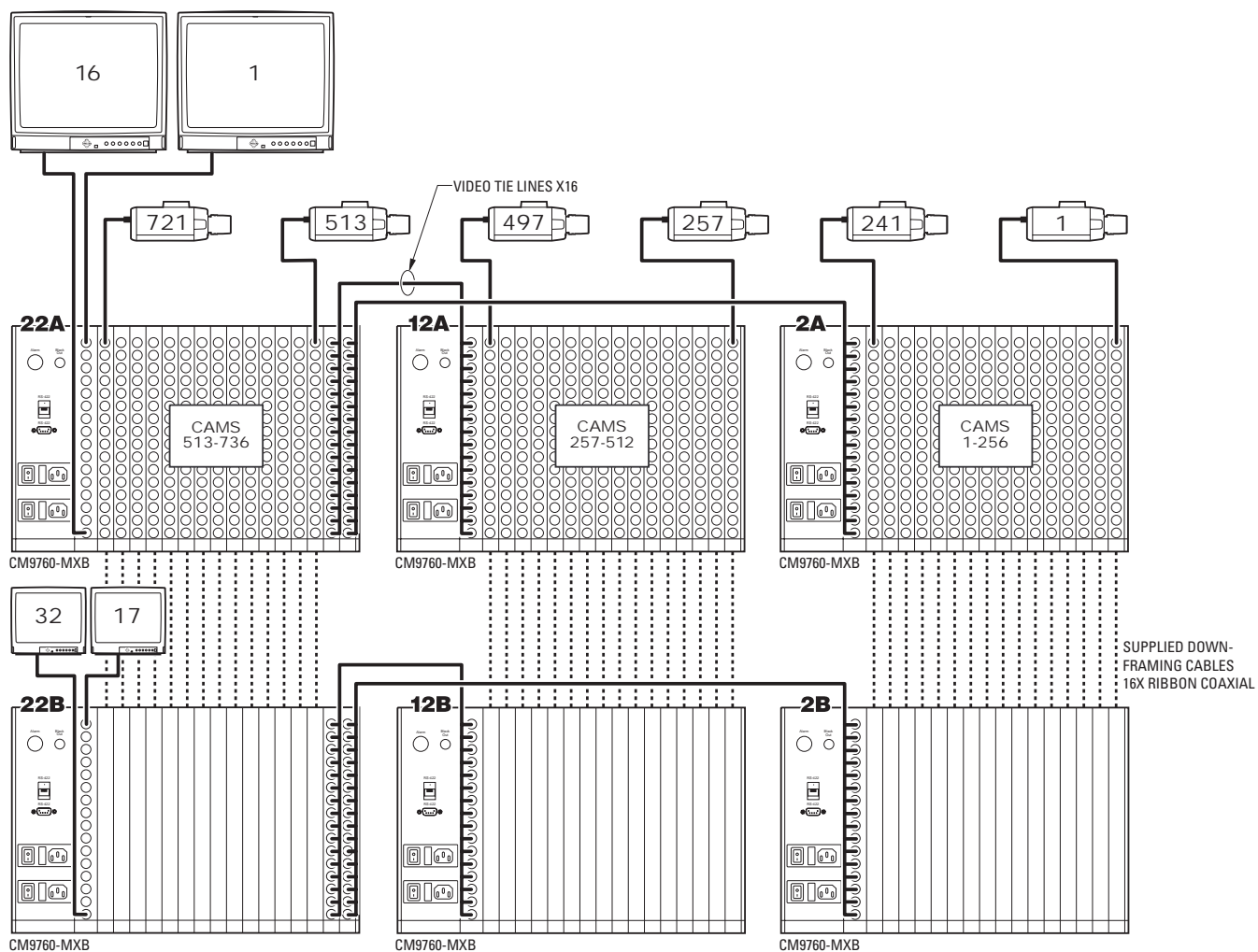
**Figure 70. Sideframing and Downframing: 496 x 48 Configuration, Looping**



**Figure 71. Sideframing and Downframing: 496 x 64 Configuration**



**Figure 72.** Sideframing and Downframing: 496 x 64 Configuration, Looping



**Figure 73. Sideframing and Downframing: 736 x 32 Configuration**

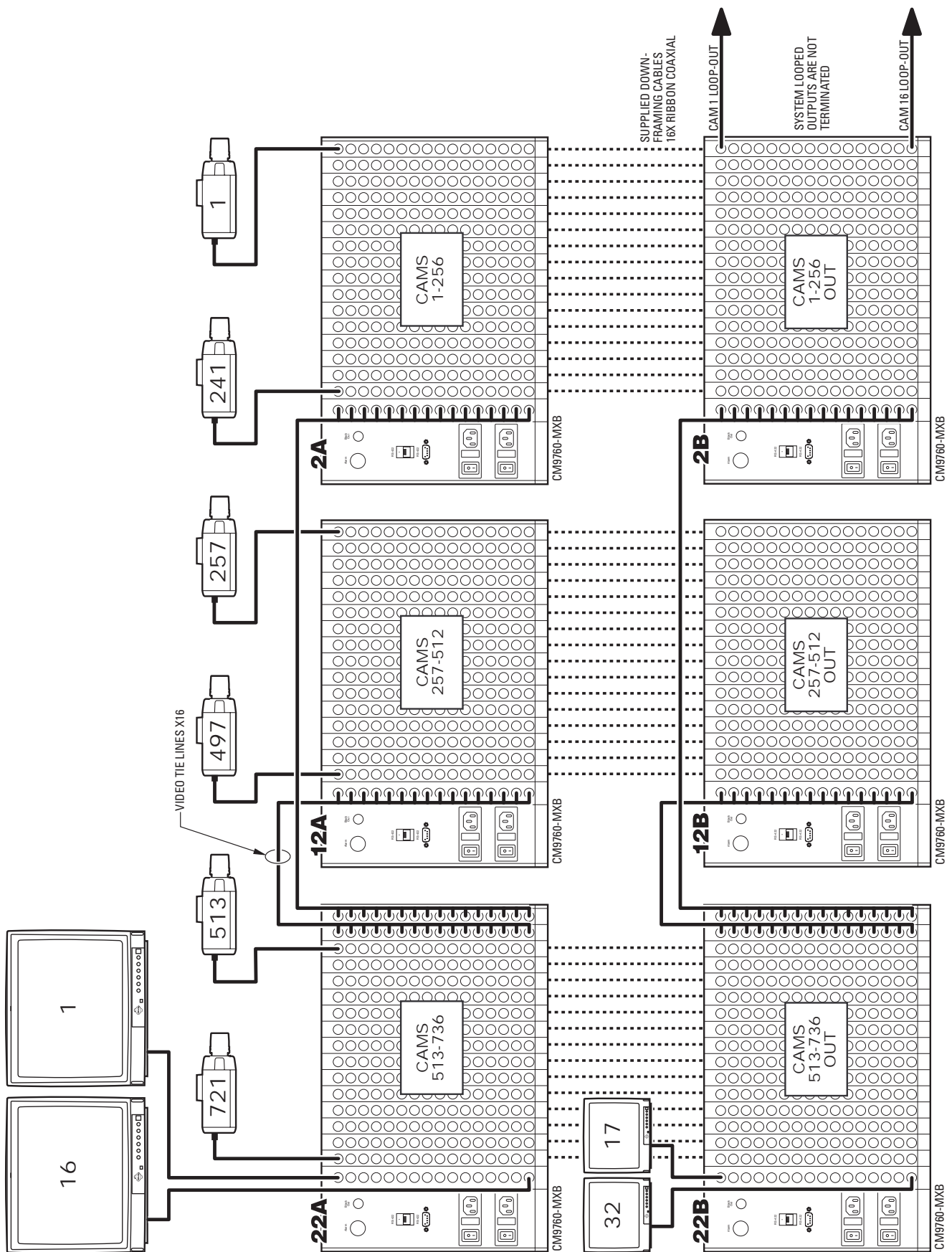
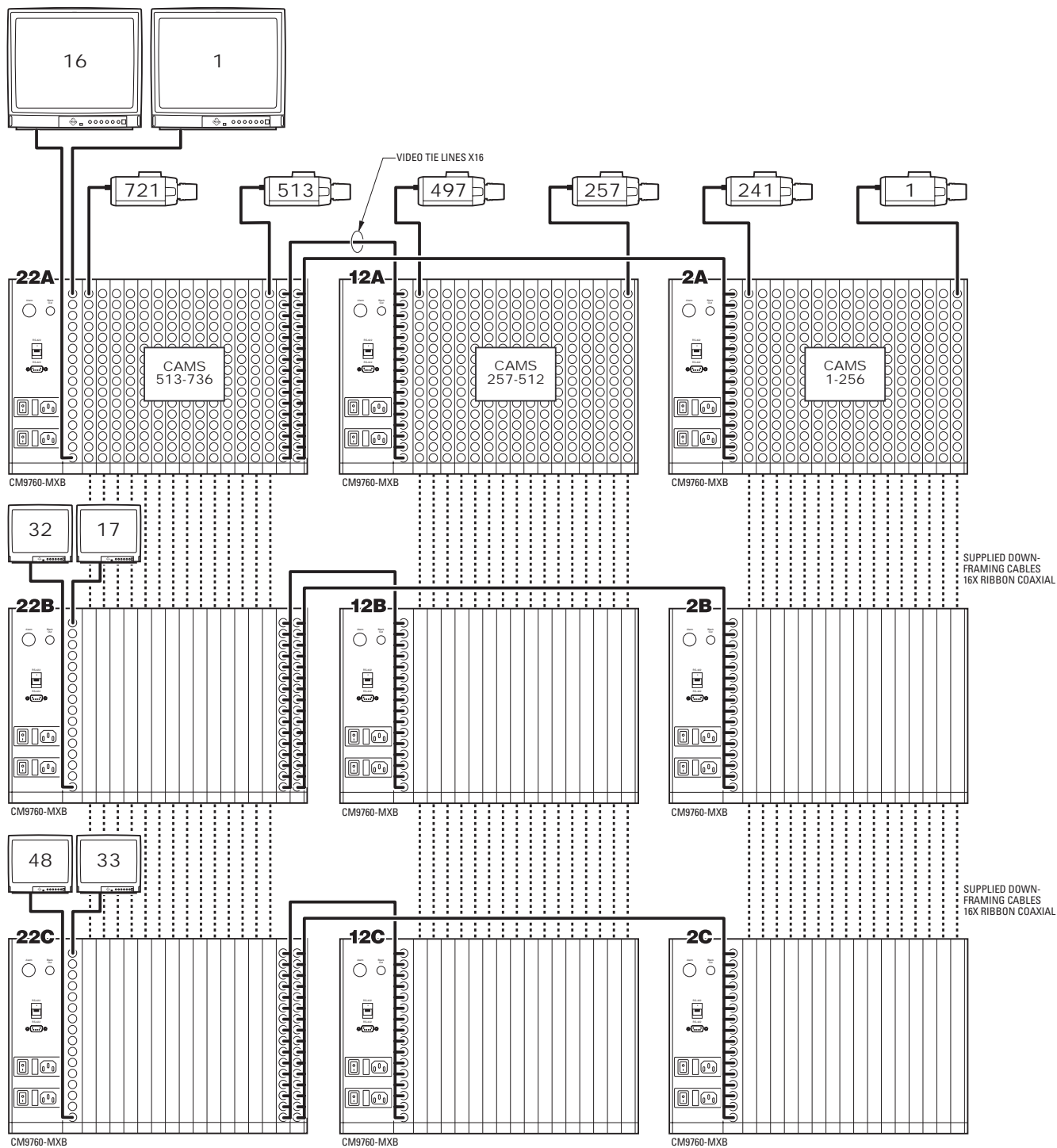


Figure 74. Sideframing and Downframing: 736 x 32 Configuration, Looping



**Figure 75. Sideframing and Downframing: 736 x 48 Configuration**



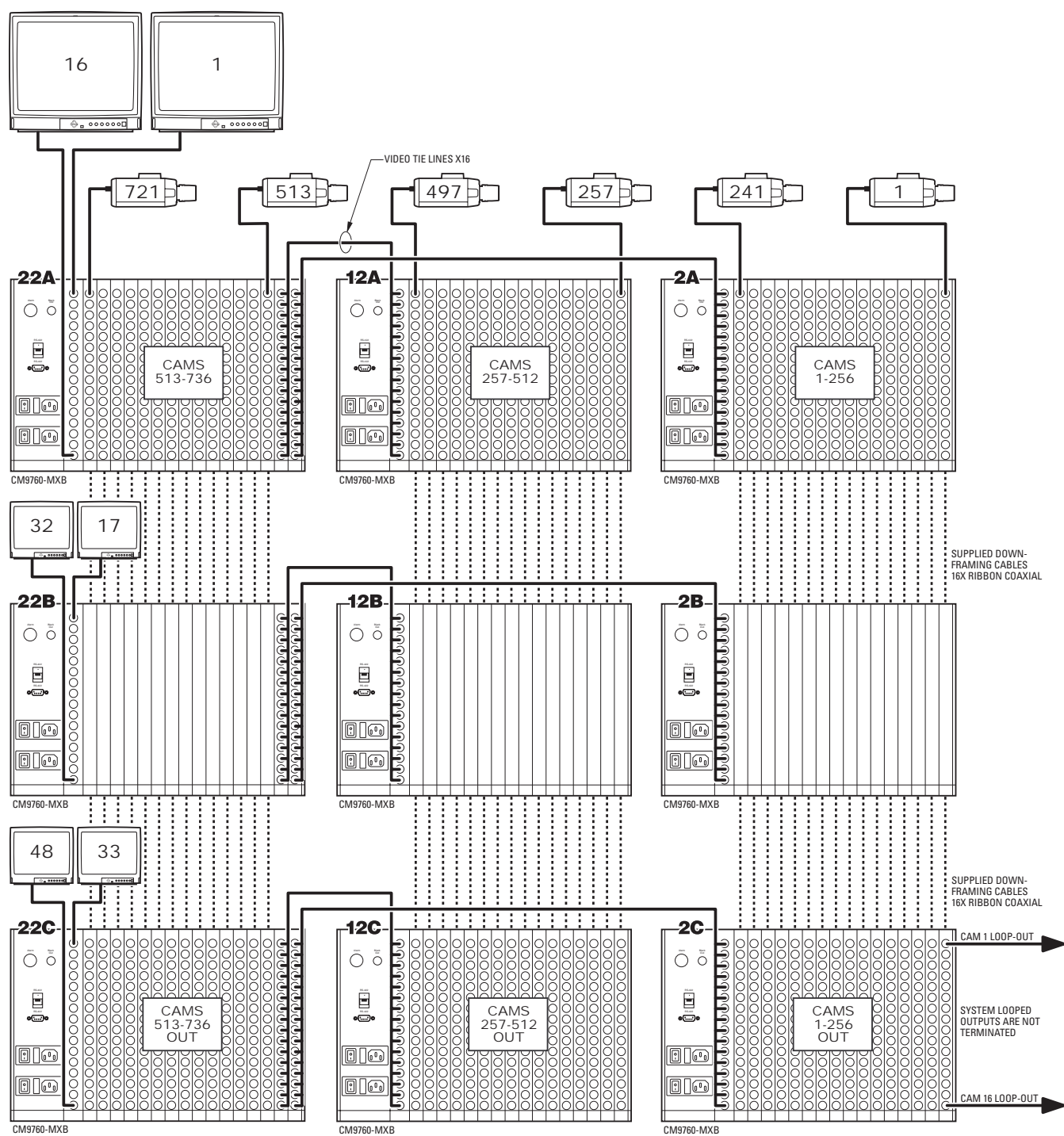


Figure 76. Sideframing and Downframing: 736 x 48 Configuration, Looping



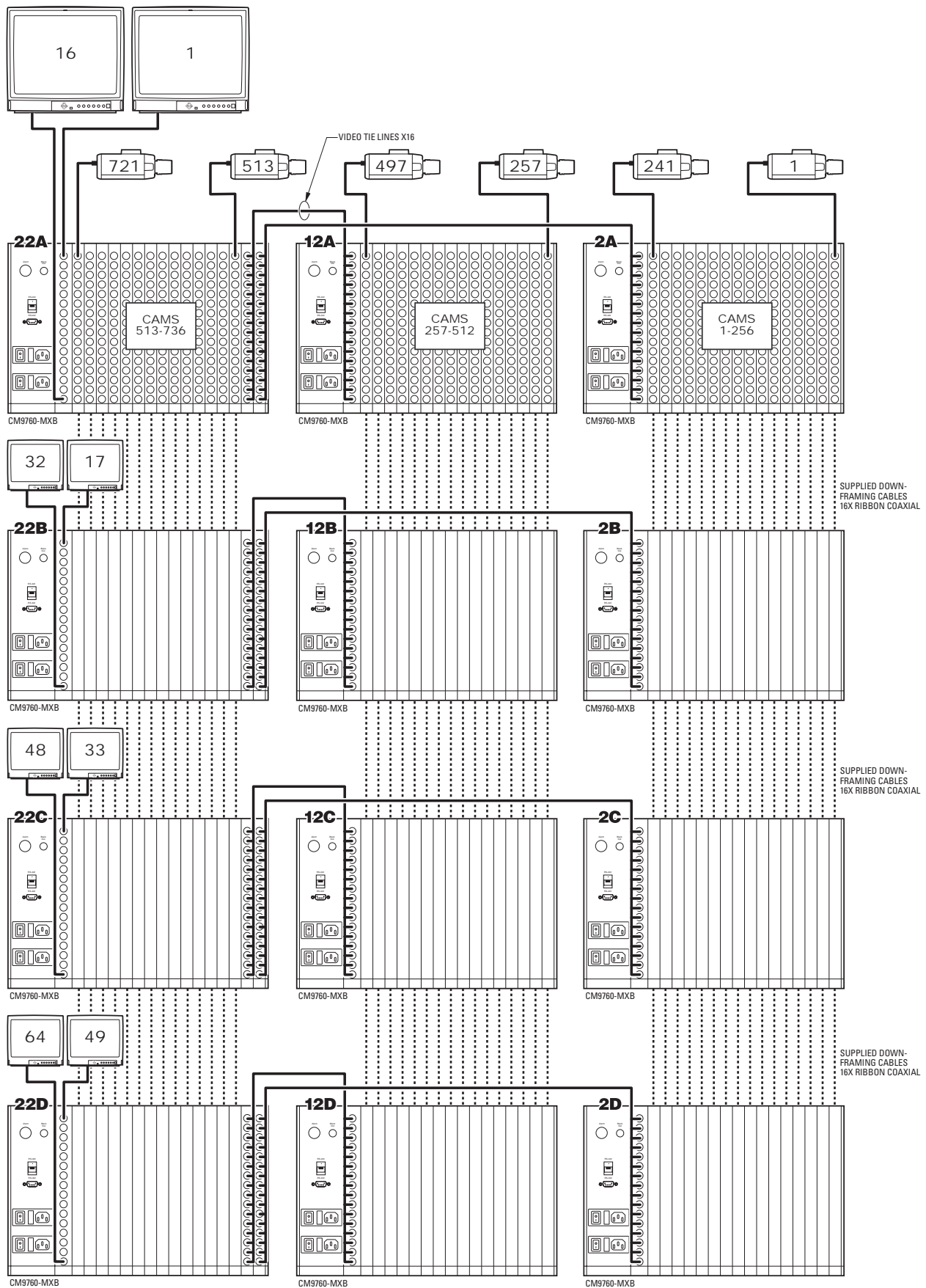
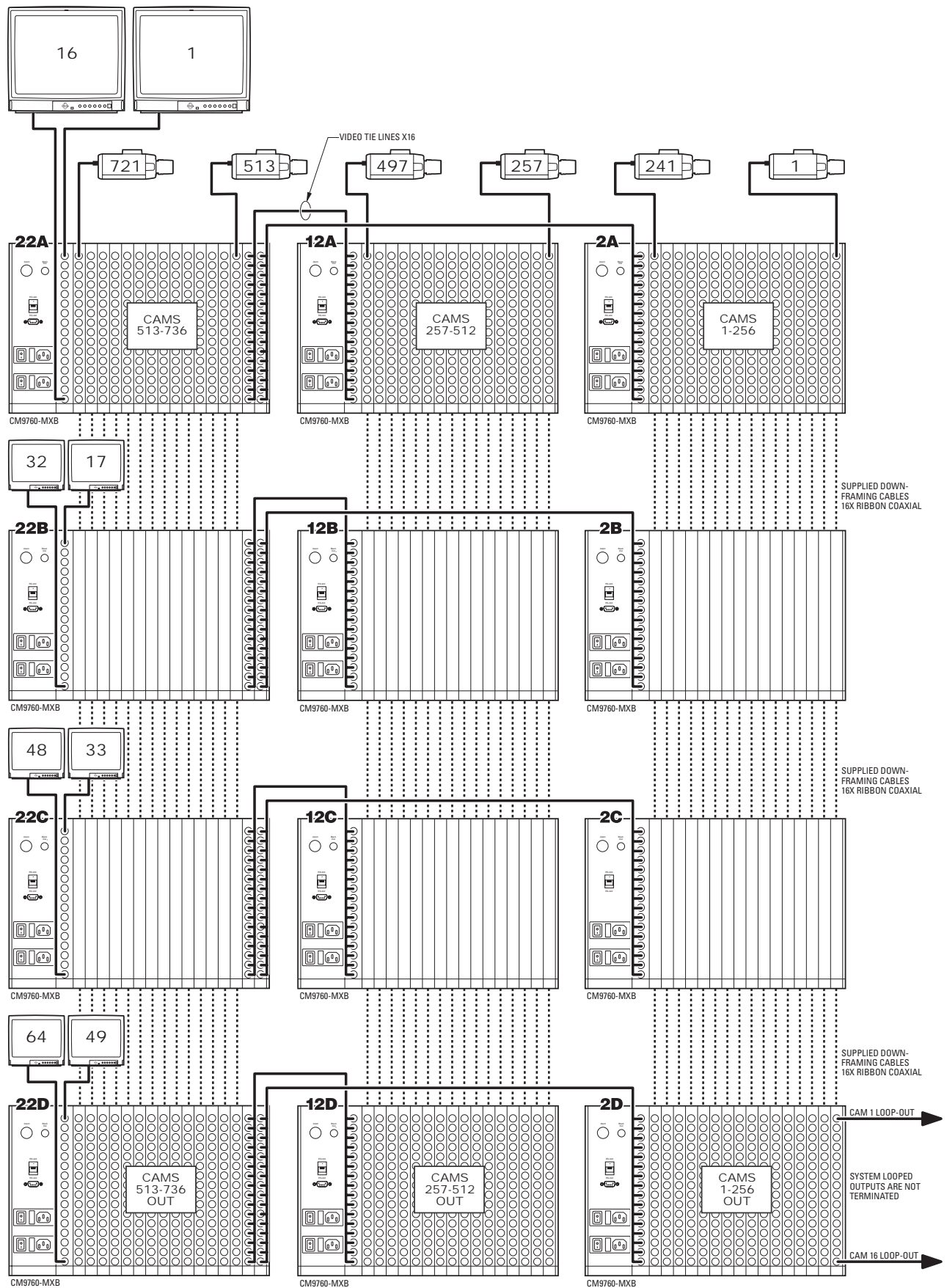
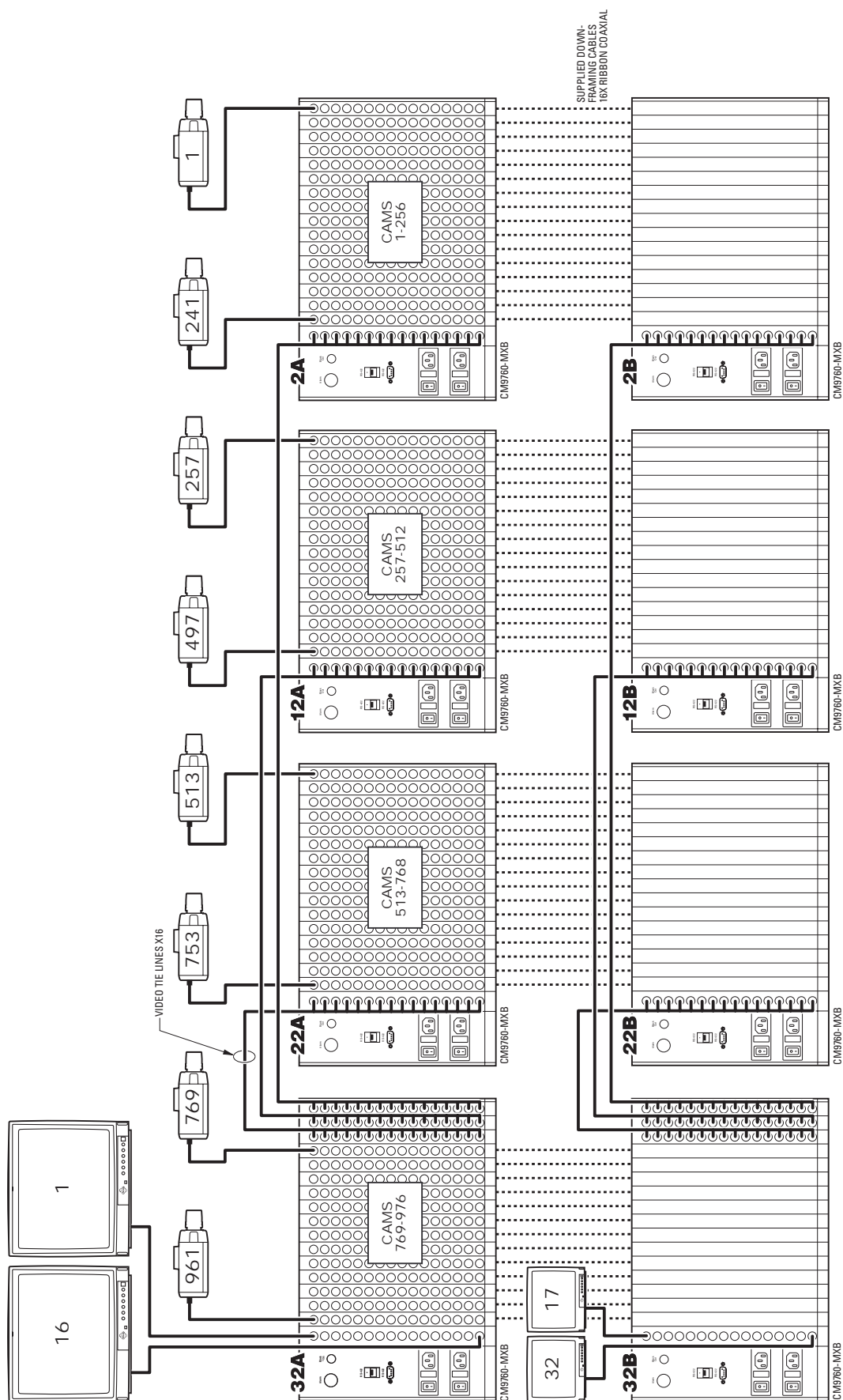


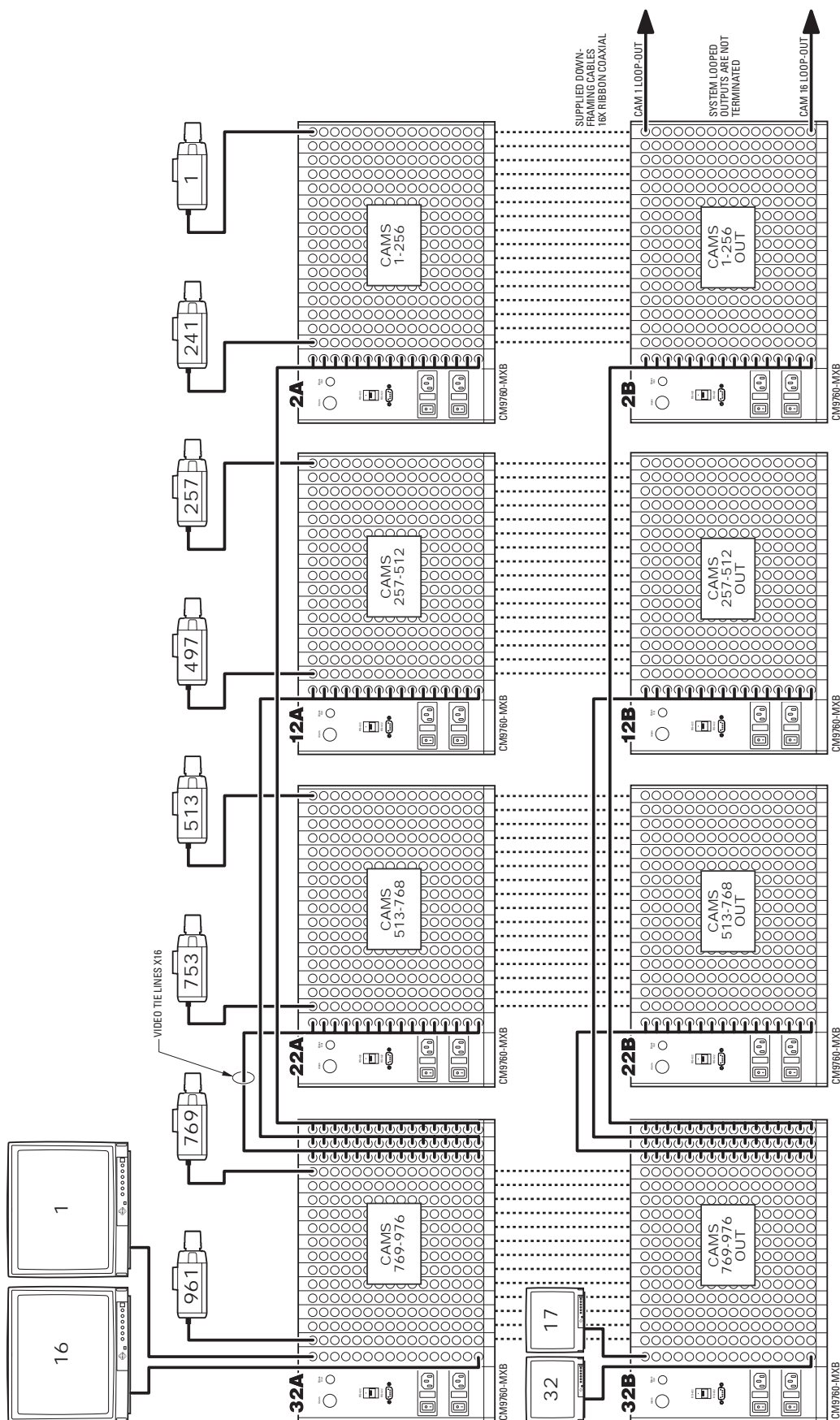
Figure 77. Sideframing and Downframing: 736 x 64 Configuration



**Figure 78.** Sideframing and Downframing: 736 x 64 Configuration, Looping



**Figure 79.** Sideframing and Downframing: 976 x 32 Configuration



**Figure 80.** Sideframing and Downframing: 976 x 32 Configuration, Looping

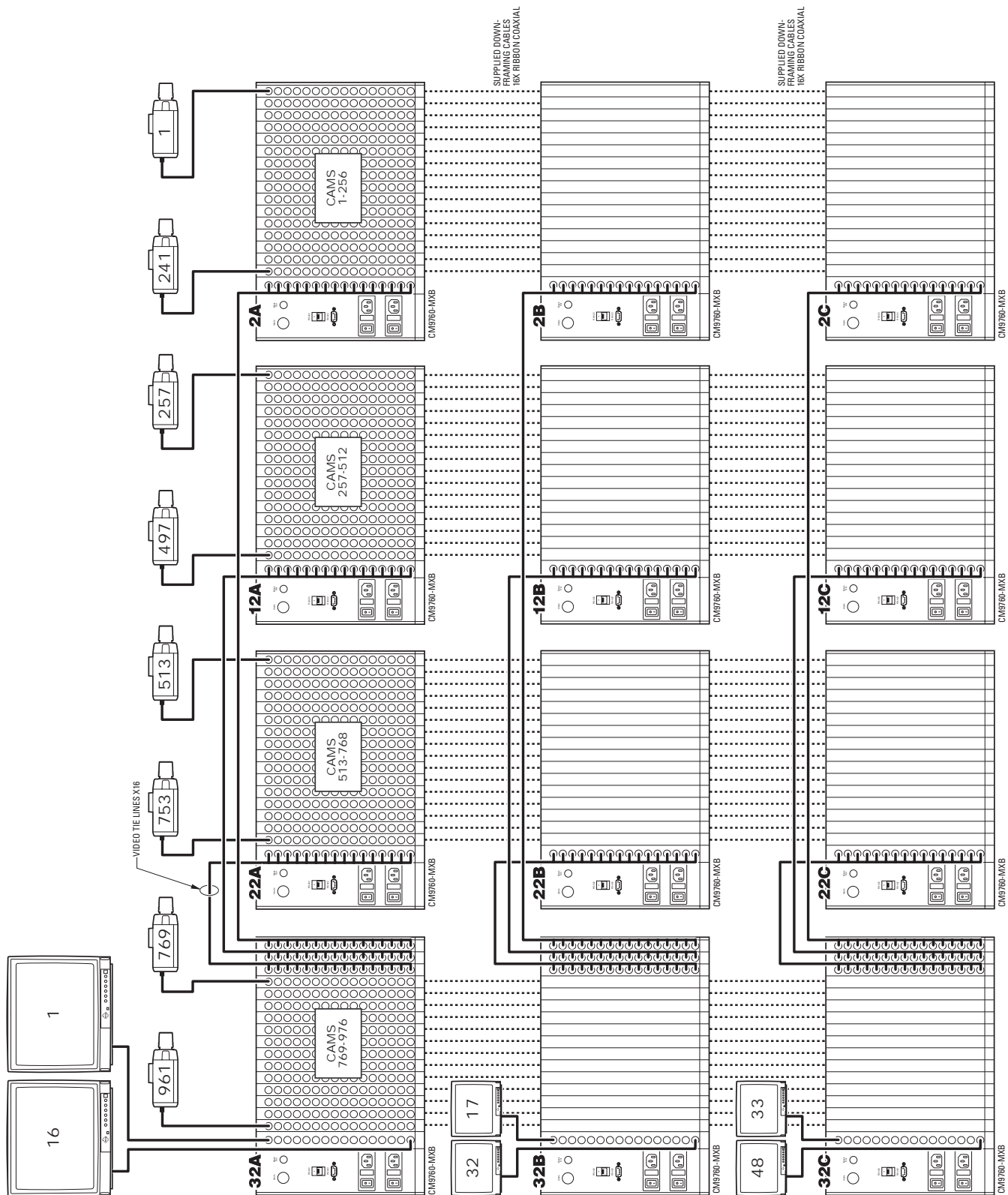


Figure 81. Sideframing and Downframing: 976 x 48 Configuration



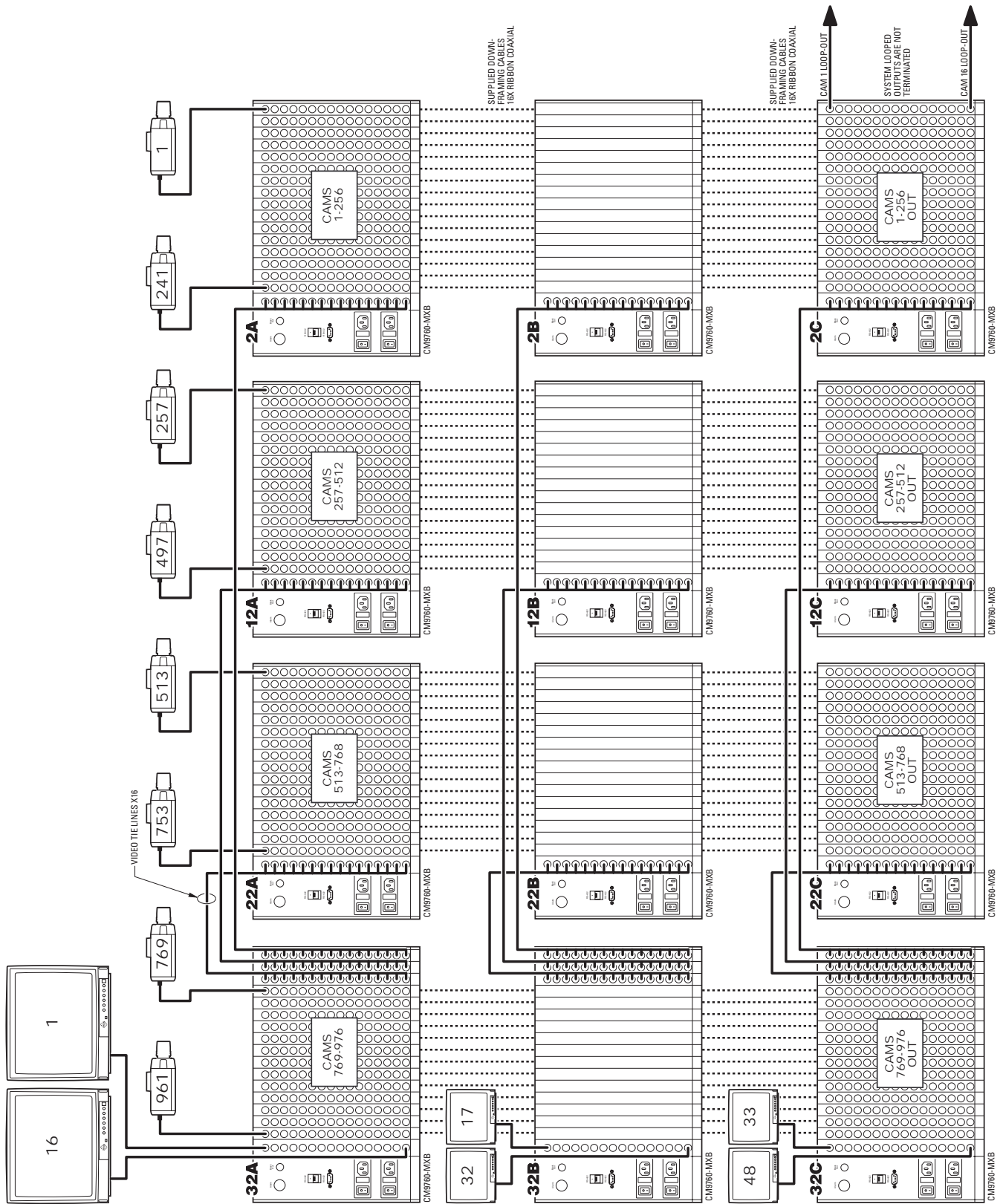
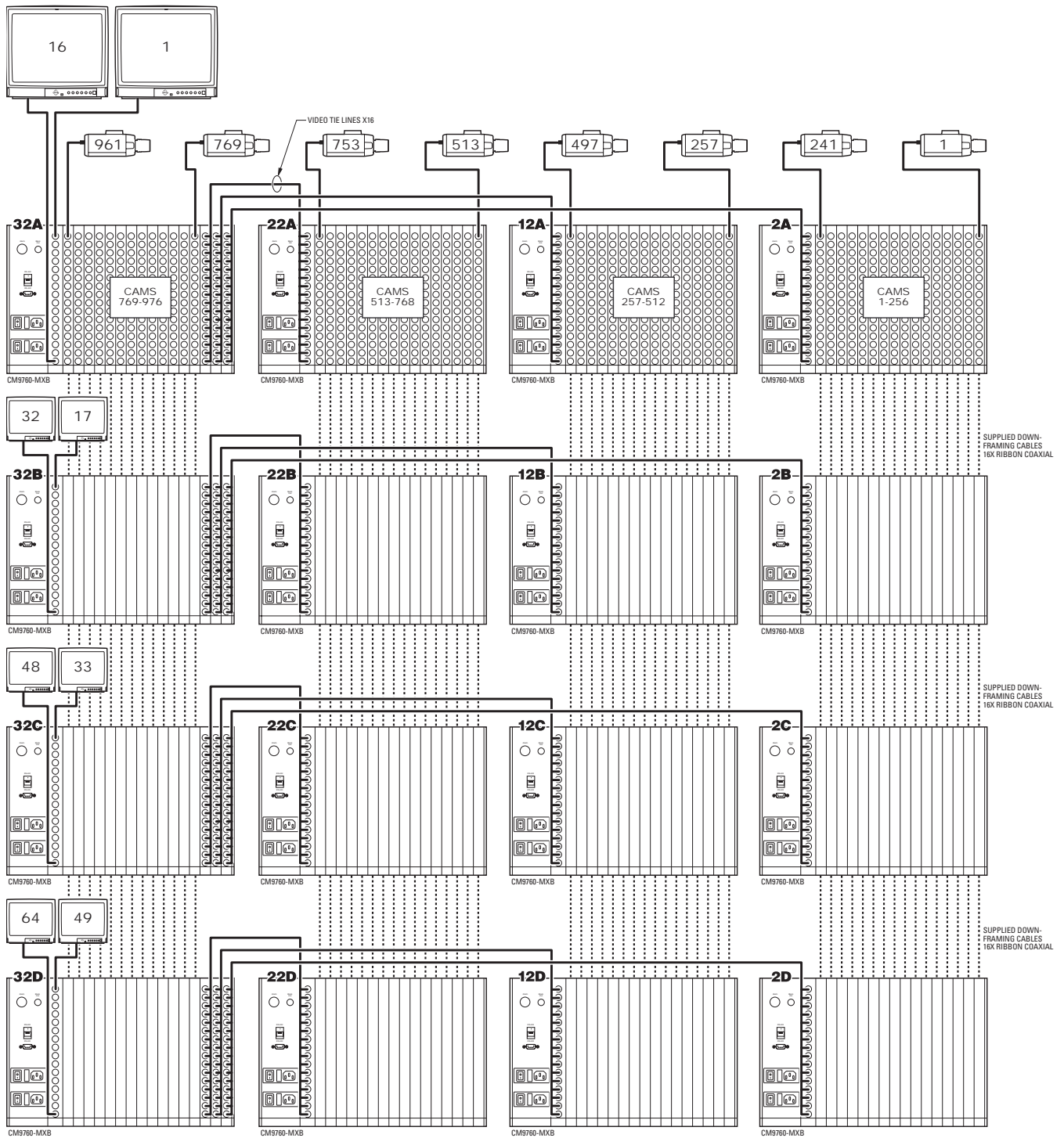


Figure 82. Sideframing and Downframing: 976 x 48 Configuration, Looping



**Figure 83.** Sideframing and Downframing: 976 x 64 Configuration

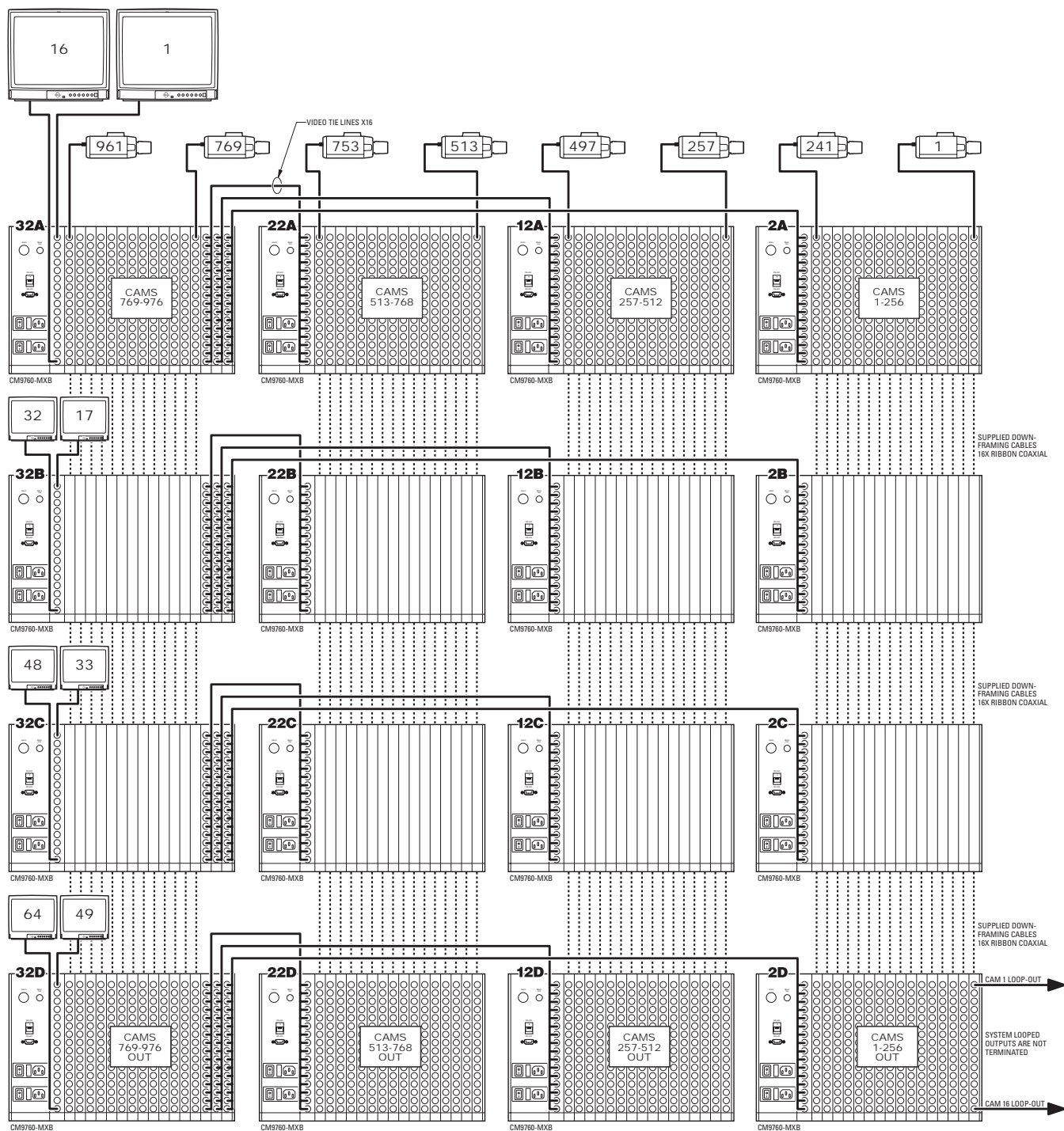
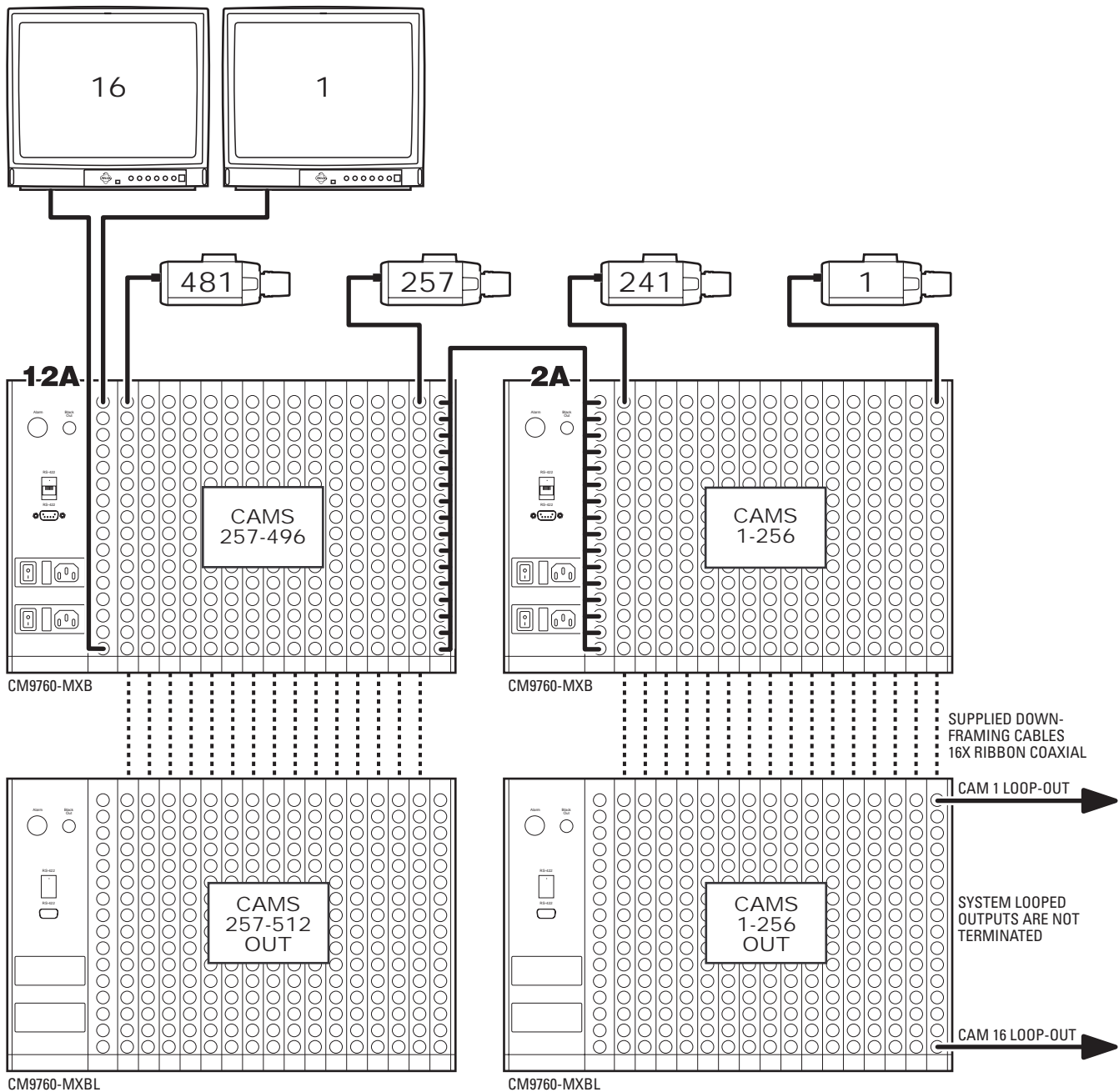


Figure 84. Sideframing and Downframing: 976 x 64 Configuration, Looping

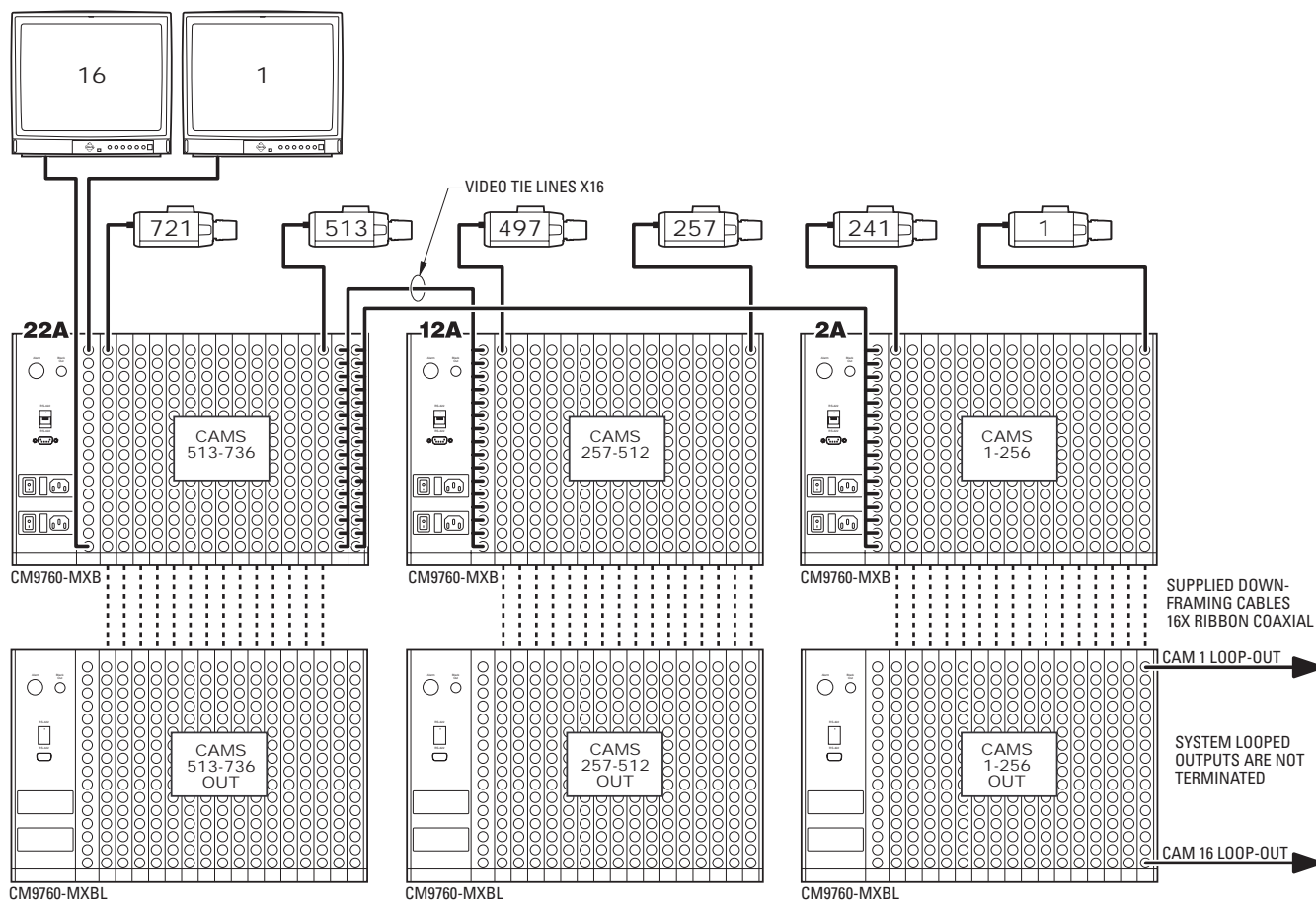


# CM9760-MXBL DOWNFRAME CONFIGURATION EXAMPLES

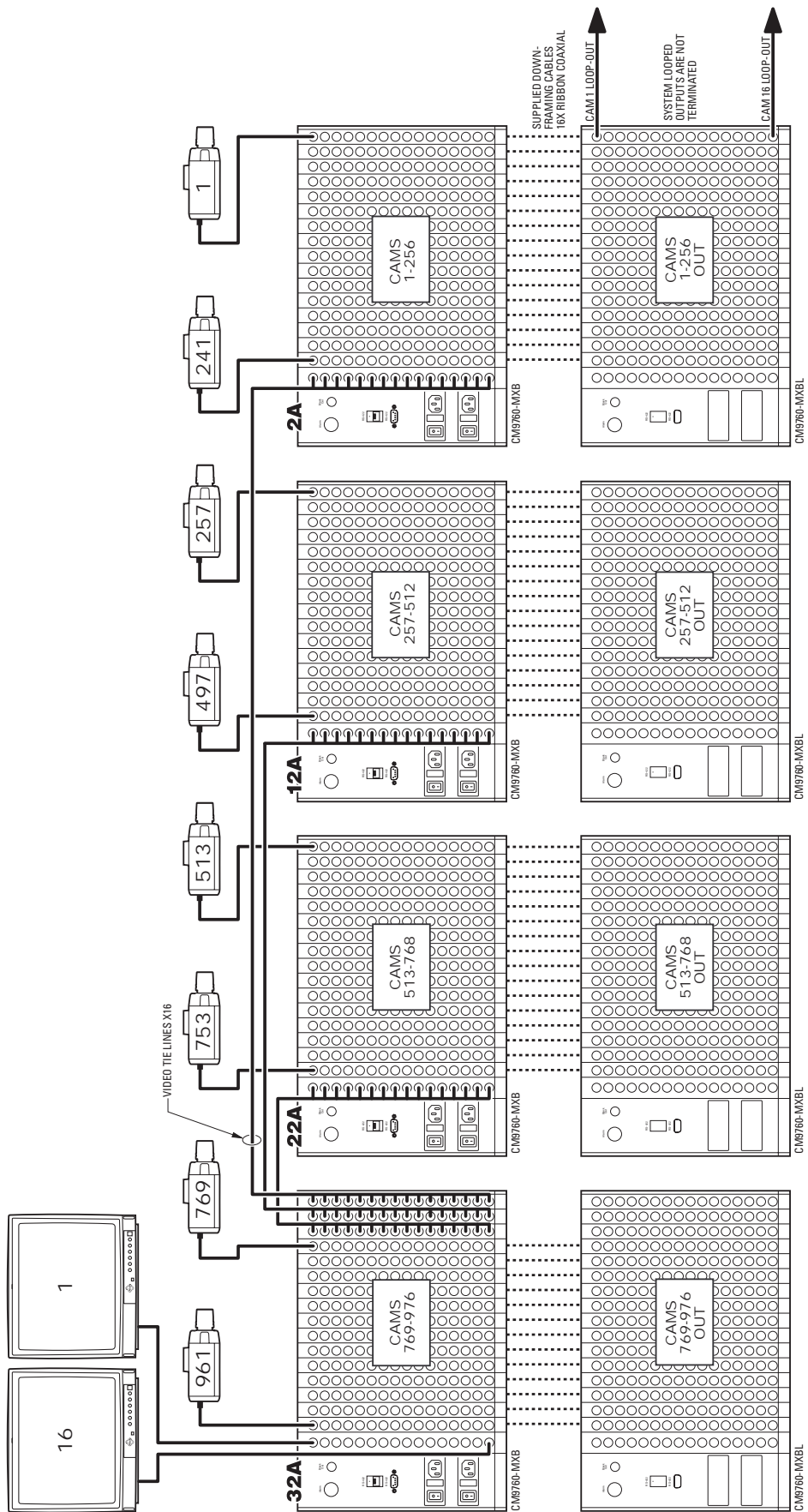
Figure 85 to Figure 87 illustrate CM9760-MXBL downframe configurations.



**Figure 85.** Downframing to CM9760-MXBL: 496 x 16 Configuration, Looping



**Figure 86.** Downframing to CM9760-MXBL: 736 x 16 Configuration, Looping



**Figure 87.** Downframing to CM9760-MXBL: 976 x 16 Configuration, Looping

## PRODUCT WARRANTY AND RETURN INFORMATION

### WARRANTY

Pelco will repair or replace, without charge, any merchandise proved defective in material or workmanship **for a period of one year** after the date of shipment.

Exceptions to this warranty are as noted below:

- Five years on fiber optic products and TW3000 Series unshielded twisted pair transmission products.
- Three years on Spectra® IV products.
- Three years on Genex® Series products (multiplexers, server, and keyboard).
- Three years on Camclosure® and fixed camera models, except the CC3701H-2, CC3701H-2X, CC3751H-2, CC3651H-2X, MC3651H-2, and MC3651H-2X camera models, which have a five-year warranty.
- Three years on PMCL200/300/400 Series LCD monitors.
- Two years on standard motorized or fixed focal length lenses.
- Two years on Legacy®, CM6700/CM6800/CM9700 Series matrix, and DF5/DF8 Series fixed dome products.
- Two years on Spectra III™, Esprit®, ExSite®, and PS20 scanners, including when used in continuous motion applications.
- Two years on Esprit and WW5700 Series window wiper (excluding wiper blades).
- Two years (except lamp and color wheel) on Digital Light Processing (DLP®) displays. The lamp and color wheel will be covered for a period of 90 days. The air filter is not covered under warranty.
- Eighteen months on DX Series digital video recorders, NVR300 Series network video recorders, and Endura® Series distributed network-based video products.
- One year (except video heads) on video cassette recorders (VCRs). Video heads will be covered for a period of six months.
- Six months on all pan and tilts, scanners or preset lenses used in continuous motion applications (that is, preset scan, tour and auto scan modes).

Pelco will warrant all replacement parts and repairs for 90 days from the date of Pelco shipment. All goods requiring warranty repair shall be sent freight prepaid to Pelco, Clovis, California. Repairs made necessary by reason of misuse, alteration, normal wear, or accident are not covered under this warranty.

Pelco assumes no risk and shall be subject to no liability for damages or loss resulting from the specific use or application made of the Products. Pelco's liability for any claim, whether based on breach of contract, negligence, infringement of any rights of any party or product liability, relating to the Products shall not exceed the price paid by the Dealer to Pelco for such Products. In no event will Pelco be liable for any special, incidental or consequential damages (including loss of use, loss of profit and claims of third parties) however caused, whether by the negligence of Pelco or otherwise.

The above warranty provides the Dealer with specific legal rights. The Dealer may also have additional rights, which are subject to variation from state to state.

If a warranty repair is required, the Dealer must contact Pelco at (800) 289-9100 or (559) 292-1981 to obtain a Repair Authorization number (RA), and provide the following information:

1. Model and serial number
2. Date of shipment, P.O. number, Sales Order number, or Pelco invoice number
3. Details of the defect or problem

If there is a dispute regarding the warranty of a product which does not fall under the warranty conditions stated above, please include a written explanation with the product when returned.

Method of return shipment shall be the same or equal to the method by which the item was received by Pelco.

### RETURNS

In order to expedite parts returned to the factory for repair or credit, please call the factory at (800) 289-9100 or (559) 292-1981 to obtain an authorization number (CA number if returned for credit, and RA number if returned for repair).

All merchandise returned for credit may be subject to a 20% restocking and refurbishing charge.

Goods returned for repair or credit should be clearly identified with the assigned CA or RA number and freight should be prepaid. Ship to the appropriate address below.

*If you are located within the continental U.S., Alaska, Hawaii or Puerto Rico, send goods to:*

Service Department  
Pelco  
3500 Pelco Way  
Clovis, CA 93612-5699

*If you are located outside the continental U.S., Alaska, Hawaii or Puerto Rico and are instructed to return goods to the USA, you may do one of the following:*

If the goods are to be sent by a COURIER SERVICE, send the goods to:

Pelco  
3500 Pelco Way  
Clovis, CA 93612-5699 USA

If the goods are to be sent by a FREIGHT FORWARDER, send the goods to:

Pelco c/o Expeditors  
473 Eccles Avenue  
South San Francisco, CA 94080 USA  
Phone: 650-737-1700  
Fax: 650-737-0933



This equipment contains electrical or electronic components that must be recycled properly to comply with Directive 2002/96/EC of the European Union regarding the disposal of waste electrical and electronic equipment (WEEE). Contact your local dealer for procedures for recycling this equipment.

### REVISION HISTORY

Manual #	Date	Comments
C1572M	9/05	Original version. This manual supersedes component manuals for the CM9760-CC1 (C541M), CM9760-MXB (C543M), and System 9760 Installation (C1503M).

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